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## TABLE OF CONTENTS.

PAGE.

**PHILOSOPHY.**
1. A Plea for the Occult.* Hon R. T. Van Horn . . . . . 413

**MINERALOGY.**
1. Identification of Minerals . . . . . 425

**PROCEEDINGS OF SOCIETIES.**
1. Social Science Convention of Kansas and Western Missouri . . . . . 429
2. Art from a Practical Standpoint Mrs. S. M. Ford. . . . . 430
3. Seventeenth Annual Meeting of the Kansas Academy of Science . . . . 454
4. Address: Necessity of State Geological Survey. Dr. R. J. Brown . . . 454

**ARCHÆOLOGY.**
1. The Lost Atlantis. Mrs. H. M. Holden . . . . . 435
2. Buried Cities . . . . . 440

**ASTRONOMY.**
1. Sun and Planets for December.* 1884, Wm. Dawson . . . . . 445

**METEOROLOGY.**
1. The Panama Canal, Influence of, Upon Climate.* M. O. Baldwin, M. D. . . . . 446
2. The Atmospheric Haze of 1883 and 1884.* W. H. Pratt . . . . . 447
3. Kansas Weather Service.* Prof. J.T Lovewell . . . . . 451
4. Is the Rainfall of Kansas Increasing? Prof. F. H. Snow . . . . . 456

**ENGINEERING.**
1. American and English City Rapid Transit . . . . . 452

PAGE.

**GEOLOGY.**
1. The Gravels of Southern Kansas.* G. C. Broadhead . . . . . 453

**MEDICINE AND HYGIENE.**
1. Cocaine as a Local Anæsthetic.* F. B. Tiffany, M. D. . . . . 462

**BOOK NOTICES.***
1. Annual Report of the Smithsonian Institution for 1882 . . . . . 464
2. Publications of the Washburn Observatory, Vol. II. . . . . 464
3. First Principles of Natural Philosophy. Sheldon & Co . . . . . 465
4. The Home Physician, G. P. Putnam's Sons . . . . . 465
5. Bulletin of the Museum of the State University of Missouri . . . . . 465
6. Public Relief and Private Charity. G. P. Putnam's Sons . . . . . 466
7. A Young Girl's Wooing. Dodd, Meade & Co . . . . . 467
8. The Religions of the Ancient World. J. Fitzgerald & Co. . . . . 467
9. Other Publications Received . . . . 468

**SCIENTIFIC MISCELLANY.**
1. Recently Patented Improvements.* J. C. Higdon, M. E . . . . . 468
2. The Grasses of the Great Plains . . . 469
3. The State of Iowa One Hundred and Sixty Years Ago . . . . . 470
4. The Laboratory that Jack Built. 472
5. Spouting Oil-Wells in Russia . . . . 475

**EDITORIAL NOTES** . . . . . 473

**ITEMS FROM PERIODICALS** . . . . 475

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# REVIEW OF SCIENCE AND INDUSTRY,

A MONTHLY RECORD OF PROGRESS IN

SCIENCE, MECHANIC ARTS AND LITERATURE.

VOL. VIII. DECEMBER, 1884. NO. 8.

## PHILOSOPHY.

### A PLEA FOR THE OCCULT.[1]

HON. R. T. VAN HORN.

Our culture is drifting to specialty—is becoming one-sided. Our science and philosophy are specialized. Science confines itself to merely physical things, ignoring ethics; while theology restricts its teaching to the future life of man. There is no unity, each following its own lines of thought. There can be no completeness by this method. It is unscientific because all we can know of physical phenomena is from the action of unseen force. Nor can we comprehend the unseen by passing the facts and laws of the physical world. Man can never reach true knowledge until he studies both by the light which this inseparable relation suggests. It is from this fact that the subject of this paper is chosen—the occult in nature.

And it is well before beginning a topic to know the value of words. Occult in its strict etymology means to hide—hidden. Its popular use, including the so-called supernatural or superstitious, is not the sense in which it will be employed in what follows. In the newer philosophy there is no such thing as the supernatural. The ancient philosophers used it in the sense of the principle of things—or the unseen in nature as distinguished from the manifest. But modern

1 Read November 15, 1884, before the Kansas City Academy of Sciences.

science has rejected this conception of Aristotle, and substituted force and molecular action in its stead.

In the history of knowledge, however, we find the occult to be but a relative term. What was so in a former age is known in this, and what was occult yesterday is manifest to-day. It is in this sense we propose to deal with the word and the idea. The world had the occult in astrology, alchemy, magic, and the lightning and thunder. To-day they are knowledge, under the names of astronomy, chemistry, magnetism and electricity. The occult is now only as to the nature of these things. And this is so only, as modern thought apprehends, because thinking is fettered by fundamental conceptions as to premises, that obtained when all these were occult. The modes of thought have not been revised with the facts. Or, in other words, the basic conception of nature has not changed with the observed facts of investigation. When we go back to the time when astronomy, chemistry, magnetism and electricity were hidden from man, or obscured, we can readily grasp the theories resulting. But when we come to interpret phenomena by the light of what is now revealed we find the old systems inadequate and irreconcilable. This fact, lying at the very bottom of the discussion, accounts for the confusion of what we call the science and ethics of the time.

We are gradually changing the old form, from the occult and manifest, to a definition more in harmony with our own idioms—the seen and the unseen. Metaphysicians tell us that things as we see them are not real, only apparent or relative; that this being so, we cannot really know anything. Or, that beyond what is material and tangible is unknowable. But this is again because of the old mistake as to fundamental conceptions—or a mistake as to what is real. Our senses are for objective uses—to guard and protect the body. How then can they be the sum of knowing, or the only vehicle of knowledge. They but convey forms of knowledge to the real knower. We now recognize that the unseen governs the seen in all things. We can never attain to true wisdom by searching for the secrets of nature through matter, or for the causes of things in the physical realm. Man ought to know that it is the unseen part of himself that rules the seen. Why, then, cannot knowledge accept this fact for all as well as for self? Science calls these things the "imponderable forces." Is there any force that is ponderable? Is not, then, the unseen the real? Without the presence of the unseen everything is dead. Why then beat over the old straw of matter which when the unseen is absent is nothing?

Monotheism has been but in part developed. It reached the plane of one God, took the form of a personality distinct and apart from all else, and has so remained for thousands of years. This personality, thus dwarfed, ruled the universe and managed it as will or caprice determined. But monotheism itself now feels the impulse of the newer thought, and is unfolding as a universal principle, the conception of which is to be interpreted from universal nature. Or, in other words, the one God pervades every atom of nature as one force, one prin-

ciple, one potency—the phenomena we see being the expression of this one All. Such is to be the monotheism of the future.

Science, in the pursuit of the constitution of things physical, pursues the right method in the study of ultimates. But science as to philosophy begins at the wrong end. You can ascertain the combinations of matter by this method, but you cannot build a world by analysis, or discover the law of God by disintegration. You can take a watch apart, count and name the pieces, but the watch is gone, and the secret of the maker is his secret still—his thought has escaped you. But if you accept the maker and study it in its related parts, his idea and its uses become clear. So we cannot find the principle of things by breaking them to pieces by the blows of analysis, but we may comprehend the purpose of nature by accepting the idea of its unseen power and reading by the light of manifested phenomena. It is the synthetic not the analytic method that investigation must follow in this direction, because that was the method of world building. Analysis is valuable in giving the support of facts to synthesis, by showing that matter, from its law of affinity and repulsion, is adapted to world building and individualization, but it usurps a place for which it is not adequate when it assumes to be the only mode of demonstration—or the primary mode. It can show that all matter must have been homogeneous because it can be reduced to that condition —proving the direct process by the inverse method. And this is all that science has been able to do.

And here, in this connection, it may be pertinent to refer to a few recent discoveries which remove the last refuge of materialism and the mechanical theory of worlds—the heretofore unanswerable argument against the ultimate theory of spirit. Reference is made to elemental matter. The chemist had found certain substances that refused to yield to his forces, and these he called elements, and assigned to them ultimate qualities. Anything that did not recognize these elementary things was not true. The *New Chemistry* was printed in 1874 and contains a list of sixty-three of these substances. The revised edition of that book is just out, prepared by the same author, in which this formidable list is swept away, and in his preface the author says: "Except in a very limited sense, the so-called elementary substances are now seen to be as truly compounded as any other substances, and it is manifest that their qualities must depend upon molecular structure, or on the resulting dynamical relations, as well as on the fundamental attributes of ultimate atoms. There is, therefore, no longer any reason for limiting the statement of the great fundamental law of definite proportions to the relation of elementary substance, and clearness of exposition is gained by giving the statement the widest possible scope."

And so goes down this support of the physical school as the interpreter of cosmic law. And it brings into the foreground the singularly ignored discovery of Crookes, to which reference was made in a paper read before this Academy in 1881, as to the fourth or radiant state of matter. The only reason that seems to exist for this long neglect of a discovery by the foremost investigator of his time, is probably found in the closing sentence of his remarkable paper: That it

brings us to the borderland between the material and that beyond, for which the great student had such strong partiality.

And here I will refer to one more fact, the bearing of which will be seen on the thought involved. That is that Edison has, in the face of the negative of materialistic science, succeeded in passing a current of electricity through a vacuum. This implies, in the opinion of this remarkable genius, to whom electricity seems a native element, that there is still a more subtile medium, universal in nature, which acts as an agent for the transmission of electricity, light, heat and magnetism, and that the results of his experiment may be almost revolutionary in the finer calculations of astronomical science.

Are there any more barriers remaining to the conception of the spiritual? Science has about passed the limit of special interest in mere physics by these discoveries of yesterday. Matter, motion, heat, light, magnetism, electricity and force as studies must now give way to what is shown to control them. The day of the dreamer is dawning, and the time of the "crank" is near at hand. We may now return to our subject more direct. We have seen that astronomy, biology, chemistry and electricity have given up secrets that change the whole field of investigation and challenge the human intellect to new paths of exploration.

We cavalierly dismiss the wisdom of the ancients as too grotesque for modern consideration. But, after all, may it not be their way of accounting for things as we comprehend it rather than the conception underlying? We replace astrology with astronomy and substitute chemistry for alchemy, but are we sure they did not apprehend the cause, the principle, better than we. For it is a fact that every step forward in our researches brings us nearer to the ancient mysteries. The mineral to them was sentient, it is magnetic with us—but with both the fact remains of endowment with a quality that we can express in no better way than to call it life.

The great trouble after all is from the want of thinking. It seems as if a theory was necessarily a centenarian, and must live so long, no matter how many new births may happen. Newton for twenty years doubted his own theory of gravity, and now it has to bear many burdens which never had his authority or sanction. The same is true as to evolution—many things being credited to Darwin that he never taught. The power of thinking possessed by these great masters seems not to have survived them, and their hypotheses, instead of being modified by new facts, have been made procrustean beds to which all new discoveries have been compelled to conform. Their disciples have been too much like the man who when facts differed with his theory, said: "So much the worse for the facts."

A certain school have assumed that there is no such thing as intelligence in the order of nature—because they know nothing of it. Another school assumes to know, absolutely, all about the nature of the intelligence. And if a fact differs from either assumption the fact does not exist. Between the two truth has had a hard struggle. The one has its standard in what it thinks was said thous-

ands of years ago—the other denies and rests on that negative as the all of knowledge in that direction. Between the two the thinker is visionary or an infidel—and all that can be discussed inside the limits of toleration or sanity is a jumble of formulas about either supernatural and miraculous things, or an utter denial of them, with chance as providence and annihilation as the only certainty. Without suggestion or coloring, these are the horns of the dilemma with which the recognized teachers confront poor humanity to-day. Beside these the so-called superstitions of the ancients were very gospels to the race.

The occult in this modern age, it will be perceived, is vastly narrowed from what it was in the time from which philosophy draws its inspiration. Aristotle is claimed by modern materialism as its prophet, yet the chief part, the soul of his system is ignored. His terminology has been borrowed, but when it refers to the principle of things, or the cause of the manifest, it is mythical, superstition and pagan vagary, while the manifest, or phenomenal is exalted as the all of his wonderful teaching. Occult has lost its etymological meaning and been consigned to witchcraft, conjuring, demonology and related things. But even here the thought of these ancients is being vindicated in the light of discoveries in magnetism. Mesmer taught a century ago, yet the schools have only accepted his facts within a very few years. But, as hypnotism, this rejected truth takes its place in the ranks of accepted fact, and one more occult force becomes knowledge.

And now we find only one more door remaining closed between us and the wisdom of the ancients, but before that stands modern science insisting that it is only a blind door in the solid wall of the unknowable—impassable and impenetrable. And in its watch it is relieved by theology, which as in all the centuries of progress, interposed its little standard of infallibility as a barrier before every new door of truth. But reason and progress persisted in forcing the locks and as the doors swung back new worlds of knowledge stood revealed—the occult became the known, the hidden the revealed, the unseen the understood. And so will it be now.

There is one mistake a great many well meaning people make; that the discovery of something they did not know, or believe, would change the whole aspect of the world. They seem to forget that facts have always been. These people labor under the delusion that the world was made according to their plan, forgetting that they only from time to time find out a truth as to the nature of things. And they often stand amazed that as their little lights go out, the sun and moon and stars still shine on. But the man of progress rests serene. He hails each new truth as something in the grand economy of the universe heretofore hidden to humanity, and he fearlessly swings open this blind door in the wall and steps forward into another world of higher and grander phenomena.

Now let us try this door. We have passed the former ones of astrology, alchemy, sorcery and magic, and found the light of astronomy, chemistry, magnetism, electricity and mesmerism, or psychology. Before us is the door of superstition, but as it opens we are ushered into the world of life. And again

we find we have been mistaken: That life instead of being a thing of miracle, induced by an act of external power beyond natural law, sustained and ended by similar agency, is simply a part of the eternal order, and of necessity co-existent and continuous with the cause of all. For the first time, so far as we know, we are able to apprehend the problem from strictly scientific methods, and to comprehend its necessary conditions from the analogies and logic of precedent knowledge—because science has led us up to it step by step. And as mesmerism has been admitted to the sacred circle of accepted science we will use it as the key to unlock this door.

What is mesmerism? Phenomenally it is the domination of one mind by another, from a state induced by physical methods—passes by the hand and analogous processes—all of which are based upon the passage of a magnetic current or force from the operator to the subject. And your pardon is once more asked for reminding you that in this description we are still in the domain of accepted science. The conditions are simple: Given a person of strong magnetic organization and a person of nervous conditions, and the one controls the other, makes him responsive to his mental moods, or to act as willed to do, despite volition or will to the contrary. This is not mental force alone, for often the subject is far superior in intellectual power to the operator, and as a rule mentality or brain power is not a quality of mesmeric operators. What is the power? Scientifically, a stronger magnetic current thrown from the operator over the subject, which current or force is evolved by the will of the operator from the brain, just in kind as the currents from a battery. This so generated current is thrown upon the brain of the subject, and for the time paralyzes the will, and the brain responds to the stronger force.

What is the medium for transmittal? And here is another occult thing, for as yet science can tell you but little as to the function of the nerves. Physiology can name all the principal nerves and map out their modifications; can locate the nerve centres and trace the vast net-work going out from them, but beyond this it can do little else. Now, in view of all the facts we know, what can the nerves be but electricals—not only conductors, but like glass, exciters of electricity. Here, then, we have the means perfected to perform exactly what we see. Here, too, we have the agent for these phenomena of living organisms. The normal action of the nerves conveys the magnetic forces of life or excites the electrical currents in a degree that supplies the regular uses of the organism. Excessive or abnormal action or impulse produces more powerful currents, and so we see that people under excitement speak with greater force, act with higher power and perform tasks with more ease and facility than in an unexcited state. This arises from nervous action, an augmented generation of electric power, which carried to the grand centre of the nervous system, the brain, gives to the man extra mental and physical force. While this exists more or less in all, its manifestation in individuals is of degree. Hence all cannot mesmerize, nor can all be mesmerized.

And here science can find explanation for what has ever been a mystery—

the cause of temperament—or of what are called nervous organizations and the reverse. Also for that unaccountable thing so often seen in life, the control or domination of one person over another. If the nervous system is sensitive to magnetic influence it responds more quickly to such conditions, and we say the person has but little firmness or persistence of purpose, while on the contrary is the nervous organization less sensitive, the possessor is enabled to use the force of his will to throw over the sensitive person a power to which it must yield. Or the better to handle the subject mentally, we invent terms to express the two conditions—the one is positive or the generator, the other negative or the passive recipient. It must be remembered that while this mode of operation may be suggestion, the premises are not—for science admits the nerves, the brain, the magnetic force and the result. All these are determined to be, and the phenomena apparent. Granting these, the method must be just as described—from all analogy cannot be otherwise. So another occult force emerges from its hiding place and takes its position with the known.

With your permission this blind door will now be passed, and in deference to the occasion and this presence, the attempt will be made to deal with what you regard as pure speculation, or with that which science treats as entirely occult—immortality and the possibility of knowing the fact.

It is useless to travel over the old argument as to matter and mind. Much of the world's philosophy has been an attempt to have us know that we cannot know anything. This definition should supplant the present one of metaphysics in our standard dictionaries. Happily, however, this is passing away, and ere long we shall be permitted to recognize ourselves. We have been bound with a scientific bond to ultimate atoms, with a force that no theologic dogma ever exercised over men's minds. These atoms are the mathematical units upon which science builds the universe—persistent, indestructible, indivisible and unchangeable in weight or volume. These inexorable atoms are next made to account for changes of volume. temperature, latent energy, and the still more incomprehensible change of chemical properties. Can we conceive an atom from scientific formula? It cannot have color—for light, which gives color, is a mode of motion. It is neither hot nor cold—for heat is also a mode of motion. It has neither electric or magnetic qualities for the same reason. It cannot have weight or extension, for weight is the mere play of attractive forces, and extension is only known as resistance, which is a manifestation of force. It can only have magnitude, and in this regard it is not appreciable or comprehensible. If the atom is this paradoxical thing, what must we say of a cosmic theory that rests solely and only on this inconceivable thing? If the atom is not, the theory built upon it is a fiction.

In this reference to the atom, the argument is not original, but condensed from high scientific sources. It is not denied that it has been of service to chemical science, as a working hypothesis, but some of the most distinguished names in experimental chemistry—among them Cournot and Sir Benjamin Brodie, professor of chemistry at Oxford—have declared it a hindrance rather than a help,

and that it has proved itself inadequate to deal with the complicated system of chemical facts. At best it stands as the $x$ in hypothetical formula, but must not be recognized as a fundamental fact.

Until this settled we may be permitted to enjoy two things: One is that we are, and the other is that one of our attributes is common sense. This quality tells us that we can only observe phenomena and reason from them. To our knowing we find matter as the medium of all expression in nature. We find it unorganized and organized, as we term the two states—or living and dead. If the ultimate of what we call living is unknowable, the fact is known, and we must deal with it as we know it. Science has helped us to the last tangible condition of organized matter in bioplasm, and traced for us the process of growth. But it has not been able to seize the union of life with it, or to know how it is vitalized. Its methods have utterly failed to produce the vital substance, or to generate anything living. As far as we know, matter is not intelligent, it does not think and it cannot know. The intelligent principle must then be higher than matter, as it uses it. The least we can do is to recognize this duality. We cannot call it chance, for there is no element of chance in order, purpose, persistence and duration. It cannot be matter in motion by virtue of its material forces alone—for this is simply in logical desperation inventing perpetual motion, a recognized physical impossibility, or as one writer has it, producing a machine to lay an egg that will hatch.

We may as well lay up our yardsticks, our scales, our blow pipes, our test tubes and microscopes, and start where only the human intellect is capable of starting from—God. After all our theories, systems and philosophies, this is the only true and universal working hypothesis. All that is needed from this premise is to start right—or speaking scientifically, to interpret nature from her facts. Then our conception of the great cause will grow in harmonious and widening knowledge. If, as the world has so largely done in the past, we start with a self-imagined God, denying all facts in nature that conflict with that ideal, we must end just where science found denial of such a God imperative. But we must not imitate its error and supplant him by another self-conceived hypothesis as to the nature of things. Here, in these assumptions, of both sides, as to the great principle in nature, has been the mistake of the ages—the cause of all the so-called atheism, infidelity and materialism of the world. We find out what man is by what he does, what he says, and by the logic of his action. We do not form an idea of the man and then ignore the lesson of his acts, reject what he says, or set aside the logic of his conduct. If we do so we simply find that we have mistaken the man. Let us learn of God by like methods—the investigation of nature, its laws, phenomena and uses—and we shall find him in harmony with all. And what is of supreme importance to us, ourselves also in harmony.

The primal entity in the universe is intelligence—we call it spirit. It is superior to matter because matter is used by it. Our methods are inadequate to compass its source, but we may learn its purpose. We simply know it is, through our own conciousness, and that it controls and acts through our own organism. And

we see that all other being is acted on in like manner, or exhibits like phenomena. And we see that the phenomena are in power, extent and character, just in degree with organic structure and intelligence. Our reason then says, as these are all of like quality, only differing in degree of manifestation, that the force property or intelligence that we know to be in us, is the same in all else—or is one. And as we know that we are of both matter and intelligence, we are dual in constitution. The one we call matter and the other spirit—not that the names signify, but they are the tools we handle to express the conception.

Now, as we see matter without manifestation of spirit, we must accept the conclusion that the one is at least equal to the other, and as matter is known to be indestructible spirit must be also, and we call this quality immortal. If spirit does take on matter, as we see from our birth and growth, it must have had being before it did so. And if it had being before it manifested through matter, it cannot cease to be when the matter is worn out or destroyed as to that use. You may say this is not proved, but so we have said about a great many things that have been proved. To deny is not to prove the reverse. It may be the very best we can do with our faculties at this stage of our progressive development. We know a great many things that men three centuries ago said were impossible to be known, and our experience ought at least to teach us to be modest about setting limits to the knowable. There can be no doubt if we had not set up our own little standards of truth as infallible, and refused to look beyond, the world might have been far in advance of what it is to day. It is fair to assume that there is nothing necessary to our full happiness, our moral or intellectual needs in this life or for the life hereafter, but what we have the capacity to know, or that is not within our ability to obtain. To deny this is to assert the incompleteness of our creation—that we have the quality of want without the equivalent of satisfying—an absurdity on its face, and an impeachment of the infinite power and adaptation we see in all else in the universe. The one condition is that we seek the knowledge aright. As all we see and sense has its method of coming to our observation, we can find how it comes if we only seek in harmony with the law of that coming.

Now, if life, or spirit—the presence of which gives life—has the power of coming in connection with matter for the uses we recognize, is there any principle of logic that can make its coming impossible for other uses and by other methods? Surely the claim that it can has as reasonable ground to stand on as the most vital of our scientific assumptions, as has been shown. If it comes to stay through the modes of conception and growth, it ought to be capable of the lesser function of coming on a visit to the imprisoned spirit. If it has command of the forces of nature, or the elements of organization to direct, control, mould and express itself through the physical body for four-score years, there is no known obstacle to its coming into relation with the conditions in which it existed so long, after leaving them. To claim that it cannot is to exalt the conditions and powers of matter above those that gave it the power to first come. Or it

makes the future life inferior in state to this, which would be a reversal of all else we know of the universe.

What is the method of coming? In the case of the mesmeric example we see that one spirit in the body acts upon another spirit in the body, through what we call magnetism. If this is the medium for communication or contact, spiritually, in one case, does not all nature tell us it must be so in all cases? In the one case we see that manifestation by this means is the result of what we call will power—or in other words, spirit impulse. If the intelligence, the will and all spirit attributes survive the body, why can it not exert this will power or employ this impulse in one state as in the other? It is having them that is the controlling fact. There are certain limitations on this power in the physical form from what we call law—there must be limitations from the same cause in the other. Everything cannot be possible in the one condition more than in the other—for the fundamental fact is individuality, and this must have, to be a personality, its limitations of invasion. And here, perhaps, will be found the one great obstacle to a clearer understanding and a wider acceptance of intercourse between the two states of life by humanity. Our wrong teaching as to nature, as to matter and phenomena, and as to our conception of God, has also been against the comprehension of the relation between the two states of life.

Now, suppose we conceive God, not as a separated personality, ruling by behest, but as the universal principle of nature, his commands being eternal rules or law? That what we see was not made by him as a mere experiment, but is Him—by expression. As he employs matter for the expression of himself—life and intelligence—how could that expression come from the higher life other than by a universal law? We cannot conceive of its coming by one law, going by another and returning by a third. We must be under the one eternal law before coming, while here and hereafter. Manifestation, then, is only a thing of condition and degree—just as it is in this life. A man is superior in this life, morally, mentally, physically, just as the body he lives in is adapted to these uses—conditions being equal. This fact is as well known as any other connected with his organism. In the life to which he goes after this there must be corresponding degrees in power and capacity, else the fundamental law of progress could not find operation. And nature is prolific in these analogies if we would but see them. An uninstructed man would never believe the butterfly was the risen caterpillar; but the entomologist knows it is. The man who never saw the face or conversed with the spirit of his dead friend may not comprehend the fact, but the man who has can answer the question: "If a man die shall he live again?" It is in both cases a mere fact of knowing.

Pardon a digression here, for a few general observations. It is not necessary to express an opinion as to the religious beliefs of men. But there is one thing common to all: There is not, never was a religion among men, but was founded on the belief of the existence of man after death, and his return to this life as the evidence of that existence. The facts are the common property of all men in all ages, and better established than that Moses, Zoroaster, Confucius,

Buddha or Jesus ever lived. What these great teachers gave had this fact for their credentials. And upon this fact is based all the sanction for everything that is of value as to this life and of expectation hereafter by the millions of the race to-day. There is not one man in a million in civilization that really rejects it, and none outside that pale. The natural man is never a skeptic, for he always has the evidence, and has not the egotism to reject it.

The one great obstacle to the spread of this among educated and civilized men is this: That while his spiritual teachers dogmatically insist that it has been the fact in other times, they as oracularly assert that it is no longer so. They next assume that when it was so, it was the voice of God. That to deny this claim is sin, while to assert that it is so now is heresy. Reason, founded on knowledge in all departments of nature, tells intelligent men that one of these assertions must be untrue. Science knows there is a falsehood somewhere—and it has assumed that it is in the statement founded on tradition, because it finds so many other dogmatic claims untrue—and so it has rejected the whole.

Suppose we look at this question from the common sense historic view. Two thousand years ago, yes one thousand years ago, the fact of intercourse between the two states of life was universal among men. In what we call bible times it was recognized by prophet and philosopher alike. The only dispute was as to which was highest in authority. From the trials of power between Moses and Aaron and the magicians of Egypt, down to the appearance of the cross to Constantine, this was the question that divided men—not the existence of the fact. It was contemporaneous and universal. The monotheistic Hebrew recognized it and called it the manifestation and voice of God; the polytheistic Greek regarded it as a message from the gods. It was the same thing in both cases. This is the verdict of common sense, and if one was fact, both were facts, if one was false and a delusion, both must fall.

When religion became the state policy of emperors, kings and despots, it would not do for this voice to be uttered by anybody, and the fiction was invented that the day of "miracle" was closed, and that for all time to come man must receive instruction as to the future life from dogma, and not from the source that had given it in the past. So God was made a personal king to rule over all other kings, and man was to serve the king of kings by obedience to the temporal ruler who happened to be over him. And so the God of nature and his universal law of spiritual teaching were banished. This is not only the fact as reason apprehends it, but it is the literal fact as history records it. The agitation now is only the revival of what was once universal. And now science in the presence of facts it can no longer ignore, accepts what it calls "hypnotism," and for fear man may find that he is a spirit with immortal possibilities, it at once makes it the explanation of all the phenomena of seer, prophet and angelic visitation of the bible, the pagan oracles and the supramundane phenomena of the present. It is now somnambulism, nervous sensibility or unconcious cerebration induced by "molecular force." It don't matter that we don't know any more when this is said than we did when told that "life is the property of that which

lives"—it is scientific—there are the words, the words are things, and beyond them we don't know anything and you can't. And so we have the two teachers —the one that it was but is not, the other it is, but though we see we can never know. The newer thought meets both; it tells the dogmatist that if he is right as to the authority he rests on primarily, that authority can be found to-day as well as two and six thousand years ago. And to the scientist it says, if your facts are true, they tell that there is a higher power in man than mere molecular force, and that he is an intelligent being beyond his mere physical properties. If this view of things cannot stand, then all the claims of dogma, all the suppositions of science go for naught. The universe, physical, moral, spiritual, must be a whole, whether man has or has not the right conception in regard to it.

Once do away with these assumptions referred to, and the primitive knowledge as to life will be restored to man, nature will re-appear in all her gracious motherhood to humanity, and God be worshipped with an aspiration and beatitude to which the race has been a stranger. It will require a re-casting of creeds, but that which comes in their place will be purer, higher, grander, and satisfying to the soul of man.

It is not the purpose here to go beyond this limit, nor to dogmatize about the evidence, or doctrines and philosophy growing from this view of things. Only to present an argument from recognized facts of science and the premises of faith for the conclusion that there is nothing in either to forbid the student from investigating in this direction. To show that all barriers as to matter were being swept away by discovery and research, and that the theories held by men of science which shut out spirit from the problems of modern knowledge are rapidly disappearing before the march of demonstrated facts. Also, to point out that the facts of science itself have pushed the inquiry to the border of the unseen world; that we must question it to understand realities already in our possession, otherwise impossible of explanation. An intelligent mind can no longer maintain its position as such and ignore this inquiry—for all else has been exhausted. Science has piled hypothesis upon hypothesis to account for this and explain that, until its theories have undermined the very foundation upon which its whole structure rests. It is now rushing about blindly, denying, affirming, denouncing and embracing, but scarce a sun rises and sets but some assumption is exploded by new knowledge. Still it refuses to turn to the new light streaming in upon humanity, illuminating the minds of men with a fresh and wonderfully simple power. Theology too, thunders against the evidence of its own existence, clinging to its formulas as though the life of humanity would be buried under their crumbling walls. It seems to be terror-stricken that what it calls miracle should prove to be the law of creation, and that the light of inspiration and immortality shall, like the air, the sunlight and the seasons, be the possession of every human being by virtue of his being such.

This knowledge is open for all, and the privilege of acquiring it for himself, at first hands, is the one great boon that this movement of the age brings to humanity. Each for himself may look for it or not, as he pleases, and no one

has the right to say he shall or shall not. Nor has any power the right to compel or deter him,—the consequences are only to each and for each to bear. What has been said in this connection is to enforce, as it may, the truth that what has been in nature still is, that there is nothing in what is known to forbid or prevent the pursuit of knowledge in this direction, and that no authority has the prerogative to bar the aspiration of the soul for all the truth. We can repeat:

> " Yet these things were when no man did them know,
> And have from wisest ages hidden been,
> And latter times things more unknown shall show.
> Then why should witless man so much misween
> That nothing is but that which he has seen."

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# MINERALOGY.

## THE IDENTIFICATION OF MINERALS.

A person's first thought on picking up some unknown mineral or rock from the roadside, the quarry, or the field, is—what is this? What is the name of this object? and, if he has no more knowledge of the mineral world than the majority of people, he will be unable to answer his query, unless the specimen should chance to be quartz, mica, or some such very common mineral.

After the student of mineralogy has advanced far enough in his studies to become somewhat familiar with the subject, he begins to ask himself, when examining some fragment of the mineral kingdom, of what is this object made? What is its composition? and lastly occurs the question, how was it made? This article concerns itself only with the first of these three questions. It is well, perhaps, to say here that, in order to acquire a knowledge of the physical peculiarities of minerals sufficient for their indentification, the student should familiarize himself, by frequent inspection, with the general appearance of all minerals that come under his observation, and especially the more common species, as quartz, feldspar, mica, hornblende, limestone. etc. It is very desirable for the amateur geologist to have a collection of his own, of typical specimens of fifty or a hundred of the more common minerals and rocks, which, by the way, cost very little. If this is not convenient, he should not fail to visit the mineralogical collection in the rooms of the Worcester Natural History Society, which contains, in addition to all the common minerals, many rare and beautiful specimens from all parts of the world. It is only by careful study of the specimens themselves, object lessons, as it were, that any substantial knowledge of them can be gained.

Minerals are identified, or determined, as mineralogists say, by first noting their physical peculiarities, and afterward ascertaining their chemical composition.

We will now consider the physical characters of minerals:

1. About the first characteristic of a mineral to engage our attention, is its color. Colors, as relating to minerals, are of two kinds, essential and non-essential. The essential color of a mineral is its color when in a pure state. The non-essential is mainly the color of the impurities contained in the mineral. The essential color is found by powdering the mineral or rubbing it on any hard surface, as unglazed porcelain. The powder thus obtained is called the streak, and although the non-essential color may vary greatly, its streak is always nearly uniform. A mineral shows its true color when powdered, for the same reason that muddy water becomes white when beaten into foam and made opaque.

The essential color or streak of limestone is white or grayish white; its non-essential colors range from red, green and yellow to blue, brown and black. Common feldspar (orthoclase) may be white, gray, flesh-red, or even green, as in Amazon stone, but its streak is uncolored.

Metallic minerals, those in which metallic elements predominate, are always opaque and generally have essential colors, while vitreous or glassy minerals, which are more or less transparent, often have non-essential colors, because we can see into them and discern the impurities. Magnetite (an ore of iron) is a metallic mineral, and its color and streak are both black.

2. Closely related to color is the property termed luster, by which is meant the quality of the light reflected by a mineral as determined by the character of its surface. The two principal kinds of luster are the metallic and vitreous. The former is the luster of all true metals, and of nearly all minerals which are chiefly composed of metallic elements. An example may be seen in galena. The vitreous luster is the luster of minerals in which the non-metallic elements preponderate, as in vitreous quartz. There are various other kinds of luster, as adamantine, the luster of the diamond; resinous, the luster of resin; pearly, like pearl, as talc, pearl spar; and silky, as satin spar. When luster is entirely wanting a mineral is said to be dull, as chalk and kaolin.

3. After the color, streak and luster have been determined, the hardness is the next property that commands attention. In minerals there are all grades of hardness, from talc, which is impressible by the finger-nail, to the diamond, the hardest of all known substances. To facilitate the determination of this characteristic a scale of hardness has been devised, as follows, beginning with the softest:

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| 1. Talc. | 6. Orthoclase. |
| 2. Gypsum. | 7. Quartz. |
| 3. Calcite. | 8. Beryl or Topaz. |
| 4. Fluorite. | 9. Corundum. |
| 5. Apatite. | 10. Diamond. |

Of any two minerals that which scratches the other is the harder, and by testing an unknown mineral by those given in this scale its degree of hardness can be ascertained. For instance, if we have a specimen that scratches calcite, but is scratched by apatite, we estimate its hardness at 4, but if it should also be scratched by fluorite we would place it at 3.5. The hardness of all common

minerals, however, as nearly as we need to get it in order to identify them, can generally be determined without recourse to the scale. The hardness of common window-glass is about 6.5, and any mineral that will scratch it must be at least as hard as quartz, and any mineral that can be scratched by a knife cannot be much harder than 5.5. By the judicious use of the point of a knife and a piece of glass one can soon learn to estimate hardness well enough for practical purposes. In general, different specimens of the same mineral vary but little in hardness. There are exceptions to this rule, however, and some mineral species, as serpentine and calcite, vary greatly in this respect; the former ranging from 2.5 to 5.5, and the latter from 1 to 3.5.

4. The specific gravity or weight of minerals is one of their most constant characteristics. It is more difficult to discover, however, than hardness, and is therefore of less practical value as an aid in determining species. If the specimen is not too small, its weight can generally be estimated with sufficient accuracy for practical purposes by lifting it in the hand. Barytes or heavy spar can be readily distinguished from all minerals which it otherwise resembles by its much greater weight.

5. Most minerals occur more or less commonly in crystals, that is, in figures bounded by plane surfaces arranged regularly about a center. Minerals of the same species always crystallize in similar or allied shapes, and therefore the determination of the crystalline form is an important aid in identification. For instance, iron pyrites commonly crystallizes in cubes, thus rendering it easy to distinguish it from copper pyrites, which it somewhat resembles. Tourmaline and hornblende, when occurring in small fragments in rocks, are very similar in appearance, but the tourmaline can usually be distinguished by its long, slender, triangular crystals. In order to recognize any but the simpler forms of crystals a knowledge of crystallography, the science "which treats of the forms resulting from crystallization," is necessary, but as most minerals commonly occur uncrystallized, we are often obliged to depend upon other characteristics, and the determination of the crystalline form is seldom absolutely necessary.

6. Cleavage, or the tendency of a mineral to break along certain planes, is a property closely allied to the crystalline form, and is frequently useful in the identification of minerals. Common feldspar (orthoclase) can be distinguished from similar minerals by its peculiarity of breaking or cleaving in certain directions with a bright, even surface.

7. When a mineral does not occur, as is commonly the case, in distinct crystals, its general structure should be noted, whether it consists of an aggregate of fine grains like granular quartz, or forms a compact mass like flint or chalcedony. Notice if it is made up of a number of slender columns like some tourmaline, or of fine fibers like asbestos or satin spar. Sometimes a mineral has a lamellar structure, consisting of a succession of plates or leaves, like common mica. Again, it may be found in globular forms like marcasite, (white iron pyrites,) or in a shape resembling a bunch of grapes, termed botryoidal, like limonite or chalcedony. Minerals also occur coralloidal (coral-like) forms, as

aragonite, or dendritic (tree-like) shapes, as magnetite (magnetic iron ore). Other species occur as stalactites or stalagmites, as limestone.

There are also many other imitative shapes in which minerals are found, such as amygdaloidal, (almond-shaped,) reniform, (kidney-shaped,) capillary, (resembling a thread or hair,) reticulated, (net-like,) acicular, (resembling a needle,) etc. In short, a careful examination of the general structure and imitative shape, if any, of a mineral, will often lead to its identification without further trouble.

8. There are various other physical characters of minerals, such as magnetism, taste, odor, feel, tenacity and phosphorescence, that are often useful in their determination. For instance, magnetite can be distinguished from minerals which it otherwise resembles by its property of being attractable by a magnet, or magnetized knife-blade; native alum by its astringent taste; kaolin or clay by its peculiar odor;-and the hydrous silicates,—talc, serpentine, and chlorite, by their smooth or greasy feel. When two pieces of quartz are rubbed against each other they will emit light, or are phosphorescent. This is best seen in the dark.

The determination of the physical characters of minerals is, generally speaking, sufficient for the identification of all common, and also many uncommon, species, but there are many others that need to be tested chemically before their identification is rendered certain. This treatment is also necessary when the chemical composition of a mineral is to be ascertained, or the exact proportion of metal in an ore of silver, lead, copper, etc., determined. This latter process is called assaying.

We will now speak of the chemical characters of minerals.

Treating the mineral with acid is usually the first step. Calcite or common limestone can be readily recognized by its lively effervescence when touched with hydrochloric (muriatic) acid, while in the mass, but dolomite or magnesian limestone will only effervesce when powdered. Other minerals require the use of strong or hot acid. In addition to hydrochloric, sulphuric and nitric acids are often used. By the employment of acids the degree of solubility is determined, the presence of carbonic acid detected, and various other results obtained. After treatment with acids come the blow-pipe tests. The mineral is placed upon charcoal and submitted to the action of the flame of an alcohol lamp or gas jet directed upon it by the blow-pipe. The degree of fusibility is noticed, the color of the flame noted, and also the character of the sublimates, and the odor of the escaping gases. The mineral is heated in open and closed glass tubes, and then mixed with the fluxes, soda, borax, and salt of phosphorus. By these and other methods of treatment, and reference to a set of tables on the determination of mineral species, the exact status of the specimen in hand is finally decided.

The quantitative analysis of minerals, by which the precise proportion of each of their chemical constituents is found, requires a still more careful examination and additional treatment. A few words on the identification of rocks will not, perhaps, be out of place. To ascertain the peculiar species to which a rock belongs, it is only necessary to identify its constituent minerals, as, if we find a rock to consist of an aggregate of the minerals quartz and orthoclase promiscu-

ously intermingled, we know it to be a binary granite; if it contains hornblende in addition, it is hornblendic granite. If a rock is composed of quartz and mica, it is mica schist; if a combination of hornblende and quartz, it is hornblende schist, and if it is simply a mass of grains of quartz firmly cemented together, we call it quartzite.

Many rocks, however, are so fine grained that it is impossible to distinguish the minerals of which they are made up, with the unaided eye. In such cases recourse is had to the microscope, which generally reveals the character of the constituent minerals without further trouble, but quite often we are obliged to go still further and cut off a thin section or slice of the rock. This slice is mounted on a slide and carefully examined with the microscope, notice being taken of the reflected, transmitted and polarized light, change of color and various other peculiarities. The object is to ascertain the crystalline form, if any, of the minute particles of the minerals constituting the rock, the color, luster, and any other character possible. The science which treats of the determination of rocks by this method is termed microscopic lithology. Most specimens, however, can be identified without the aid of the microscope, so that a knowledge of this branch of the science of rocks is not indispensable to the amateur geologist.

W. H. L.

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# PROCEEDINGS OF SOCIETIES.

## SOCIAL SCIENCE CONVENTION OF KANSAS AND WESTERN MISSOURI—SIXTH ANNUAL SESSION.

The Social Science Club of Kansas and Western Missouri commenced its sixth annual meeting at Atchison, Kansas, on the 6th of November, the President, Mrs. C. H. Cushing, presiding. Reports were made by the various officers, new members elected and other routine business attended to, after which the welcoming address was made by Mrs. J. J. Ingalls and responded to by Mrs. Geo. A. Eddy.

Able papers were read in the various departments, viz. in the department of Sanitary Science by Mrs. Eliza K. Morgan, of Leavenworth, upon the "Human Foot;" and by Miss Deborah Longshore, upon "Muscle;" in the department of Natural Science by Mrs. L. M. Ward, of Ottawa, Kansas, entitled "A plea for the study of the Natural Sciences;" in the department of Philanthropy and Reform by Mrs. Anna F. Burbank, upon "Individual Reform," and by Mrs. Mary Palmer Reese, of Kansas City, entitled "Woman—Her position what she makes it;" in the department of Education by Mrs. William Tweedale, of Topeka, upon "Education considered from a Practical Stand-point;" in the

department of Literature by Mrs. S. W. H. Gardner, upon Superstition; in the Department of Art by Mrs. S. M. Ford, of Kansas City, upon "Art from a a practical stand-point;" in the department of Domestic Economy by Mrs. B. Gray, of Wyandotte, upon "How to Simplify Housekeeping;" in the department of History and Civil Government by Mrs. M. J. Kellogg, of Emporia, upon "Equal Wages for Equal Work," and in the department of Archæology by Mrs. H. M. Holden, of Kansas City, upon "The Lost Atlantis."

The Association was hospitably entertained by Mrs. J. J. Ingalls and other ladies of Atchison, and voted that the meeting had been a very gratifying success in every way.

We would gladly publish all of the above named articles in the REVIEW, but, as they would nearly fill the whole number, we must confine our selections to one or two written by ladies of our own city, which seem more legitimately to come within its scope.

## "ART—FROM A PRACTICAL STANDPOINT."

MRS. S. M. FORD.

The art of ancient Egypt is something very far away from the Social Science club of Kansas and Missouri. Phidias, with all his power for evoking the glory and spendor of Grecian beauty, is remote from its aims and thoughts; it is doubtful if a disquisition on the comparative merits of Nicola Pisano and Michael Angelo would make a very lasting impession on it as a body, or that it would even grow wildly excited over the contested superiority of Missonier or Alma Tadema. But there is a phase of the art question which concerns us all most nearly, and which ought to be brought home to each one of our firesides, because those firesides are affected very sensibly by its neglect or attention. In these days of "Woman's Art Work," such a statement can excite no opposition, and one can easily imagine half a dozen yonng ladies from the immediate neighborhood of anywhere starting forward with such exclamations as "Why, yes, to be sure! You remember my tidy with the Graces painted on it!" or "My crazy quilt with 150 different stitches!" "Or my lovely model of grandpa's nose!" But how our sweet friends would open their eyes at the reply that nothing of this kind was hinted at in the previous observation; that most of their cherished productions are hideously in contradiction with all the rules of art, have nothing to do with art culture, and that in many cases their gentle originators would find better employment in riding tricicles than in sorting crewels?

For there is nothing more disheartening in the art prospects of womankind than the extent to which women devote themselves to "fancy work." One might say that the art developement of this country lies in the hands of its women, and how do they show their appreciation of their great taste? By crocheting afghans and painting impossible Venuses, apparently. The women in larger cities, who neither paint, model nor embroider, are decidedly the exception, for the

fashion of the day is for the feminine world to spend its leisure hours in the pursuit of art, though these same women seem not to have the slightest idea of making a study of what is to them only amusement.

They have, as a rule, no knowledge of the art of former centuries and epochs, almost none of that of to-day, their taste is fed and formed solely by the inartistic surroundings of American exteriors; they know nothing, or almost nothing, of drawing, perspective or coloring, are incapable of drawing the simplest object correctly from the life, and do not dream of originating either conceptions, plans, or even the worst rudimentary drawings for their work. No matter what kind of art work they do, it cannot help but be viciously executed, since it is begotten and bred up in ignorance, and it not only ruins the taste of its authors and observers, but occasions a waste of time which is frightful to contemplate, because it might have been so employed as to bring a rich return both to the individual and the world. The hours which women spend upon the fancy work called "art," are precious possibilities dropped into a gulf of oblivion, which swallows up not only the souls of the perpetrators but sometimes numberless other innocent and helpless ones dependent upon them for the consolations of an enlightenment, which to many human beings can only come from personal contact and inspiration.

I have heard of a woman who wears a whole dress of "rick-rack," and has no idea of the infamy sewed into it; of another who sends her children to a questionable kindergarten to "keep them out of mischief," while she spends hours of every week in embroidering designs copied from advertising cards, or in painting Cupids, heroes and goddesses, with muscles and members in such perplexing confusion that a Greek could only look at them and die. Many a woman ruins health and life, and perhaps deprives herself of the sweet blessings of motherhood for just such folly as this, and never wakes up to the fact that a real love of art and devotion to it would lift her into an intellectual region where each one of her follies and prejudices would assume a quite different aspect, and might draw her into the fields where the winds and breezes could blow away her frivolities and sweep into her mind a little of their own freshness.

"But what shall we do with ourselves?" says some fair devotee of art needlework, for in spite of eating cares and unskillful Bridgets, the women of to-day have more time to spend as they choose than did our grand-mothers. We answer, paint and sew, and pound brass, if need be, but do it intelligently, and with a wide-eyed independence which will put an effectual end to servile copying and ignorant imitation. There is, perhaps, no study among the many which women can pursue nowadays, which would be richer in results than that of art, rightly pursued, and none more unfortunate in its general results, as it is followed at present.

Every woman who wishes to do even the simplest painting or embroidery, should teach herself to draw with such skill as will enable her so to change and combine designs and patterns that she will not be forced to depend upon slavish copying for the idea and soul of her work. In any kind of art-work the charm

of individuality and originality is greater than all else, and in this, as in everything which helps a woman to rise above her natural dependence, is an incalculable benefit. The thousands of so-called "art-teachers" in the country, undoubtedly retard the possible art development of our corner of the world by constantly assuring their pupils: "You don't need to know anything about drawing, you can paint just as well by sort of working out the design with the brush, and then painting it in," etc., etc., as if the drawing were not the heart, the soul, the living foundation of every picture?

But aside from the drawing, there is another thing of equal importance, if not for the execution, at least for the inspiration, of any art work, from a bunch of violets to the "Death of Cæsar." And this is a knowledge of the growth and development of art in the world, a familiarity with the most beautiful things a man has executed, and some comprehension of their productive causes. There is no patient wood carver who will not gain new interest in his work by some knowledge of the quaint creations of the middle ages, the wealth of pictured wood with which Durer and Veit Stoss enriched the narrow streets and pointed gables of Nuremberg; not an enthusiastic crewel worker who will not work faster and dream fresher designs, if she knows something of the tapestries which the patient fingers of Matilda and her ladies made to bloom with the story of England's conquest, or of those more wonderful ones, for which the great Raphael himself made the designs. Even a simple baby-face is drawn better if one has in mind not only the sweet little cherubs which one sees upon the streets or in one's own home, but a miz-maze of all the divinity which Murrillo, Corregio, Francia, and a host of others have drawn from the child world. There is positively no end to the benefit of cultivation and intelligence in even the most elementary art-work, and if one could persuade Mr. Alma Tadema to compete with Mrs. Brown-Smith in making a crazy quilt, the effect of it would be felt immediately, for with that artist's knowledge of the color and form effects of the past and present, there could be no doubt as to who would bear away the prize.

"But," says some fair objector, "one can't learn all these things without going to Europe, and we cannot all afford to take a trip of such magnitude." Dear friend, the thoughtful observer of crewel roses would answer, you must do all this in order to appreciate a trip to Europe, and it can be very easily done. Books are so much cheaper than they were a few years ago, that any one who is willing to endure some deprivations in the way of dress for instance, can have a respectable art library, while the abundance of photographs of all pictures easily accessible, enables every one to become familiar with the works of the masters at small cost. Moreover one can obtain large carbon photographs at from three to six dollars a copy, which are really the most satisfactory reproductions of the old masters, because they represent all the cracks and defacements of the old canvases and give no false impression as to their preservation. Art culture is a very subtile thing. One can not get it from a few months sojourn on the continent, or by a hasty brushing up of knowledge in preparation therefor, it must be a slow growth fed by constant observation of good models, and this is why the carbon

photographs are such a boon to America. A few of them, with the addition of some good engravings and etchings hung upon the walls—not of the drawing room alone, unless one is a person of very elegant leisure and spends most of one's time there—but upon those of the sitting room, kitchen, and nursery, if need be, will be a constant source of elevation and refinement of taste. Few people realize how sensitive their own minds are to impressions, impressions too subtile to be felt or recorded at the time of receiving them. If they did they would be more careful of their own environments, and fewer Americans would rush through the British museum and the Louvre, naming the Elgin marbles and Venus of Milo "stumps," bringing home, one might add, no strong remembrance of foreign scenes, except the determination to serve wine with dinner henceforth.

But perhaps we are improving in regard to "environments." There is a great furore nowadays for artistic furnishing, a "craze" for Eastlake designs, painted tapestries, and bric-a-brac, without which the perfect mansion is believed to be very incomplete, and concerning which one sometimes feels like asking, is this all that constitutes the proper furnishing of our interiors? We hear very frequently the phrase, "O, she has such a lovely, artistic home"—a phrase which upon investigation is often found to mean a home where the ordinary accessories of curtains, hangings, ornaments and furniture generally are combined and grouped with unusual harmony, and where too frequently the frigidity of the perfection tells a sad tale of the extent to which the house is abandoned and forsaken by its owners and enjoyers, for the sake of preserving its treasures intact; for while the horrible parlor of our grandmothers is rapidly vanishing before the advance of civilization, the combination of poor servants and a desire for elegance, induces many a housekeeper to fill her whole lower floor with all the pretty things she can collect, after which, for the sake of keeping it in order, she deliberately shuts out the sun, the children, and that charm of her own occupancy which does more than anything else to render an apartment cozy and inviting, restricting her family—and especially the childish portion of it—to rooms devoid of ornament or pleasant aspect. Now is this all very wrong, but especially wrong in regard to the little ones, particularly if the owner of such a home is aware of the very decided difference which exists between prettiness and artistic beauty, between the artistic harmony of form and color which appeals only to the senses, and the high intellectual quality which appeals to and educates the loftiest part of our nature.

It is in this latter quality that a home should be artistic. Its walls should not only be softly and harmoniously frescoed and papered, but they should be covered—not ornamented only—with pictures which educate the senses by their beauty and rouse the purest sentiments by their silent and never ceasing appeals. Let the curtains, the furniture, the bric-a-brac be ever so beautiful, if the other element is lacking the individuality of the home is gone, for while an upholsterer of taste and intelligence can do all the rest for us, we can not hire any one to take the place of our own educated taste. In this country such home adornments

must consist largely of engravings, etchings and photographs, for few persons can afford to buy many paintings, and if these are not of the very highest order the reproductions are decidedly preferable. Again, in a home where there are children one should find as large a collection as possible of loose pictures and illustrated books, containing etchings and engravings, which the children must be allowed to handle as freely as they do their toys—books not intended for children, but such as a critical and cultured taste demands for its own enjoyment, for it is only by such constant, free and unwatched handling of precious materials, that the more precious child mind can get the food it needs to bring all its divinity to maturity. A child is even more moody than a grown person, and is not always in a receptive humor, when the mother is ready to take out the prized volumes and rare portfolios, and with many injunctions to "be careful" lay them before the childish eyes. All the intellectual doors a mother can open for her little ones must stand wide, and she must educate in herself a divine economy which will teach her that all the wear and tear of earthly fuel are nothing in comparison with the priceless fires to be fed by it, and that the little finger-marks in her valued books and pictures are the sure testimonials of unquenchable bright spots in the childish soul.

"But what is the use of all this fuss and feathers about a few pictures," cried one practical soul. "I shan't take all that trouble when I don't intend to be an artist, and what good will it do me to know a little something about the Sistine Madonna and the Laocoon?" But, dear friend, man is such a complex creature, and usually so stubborn in wickedness, that all the aids which can help him to rise above his natural animal level are worth trying. Plato rated art only fifth in the scale of good things which may elevate mankind, but we moderns, believing that art comes nearer than anything else to a visible illustration of those very unattainable ideals of which Plato is always preaching, place it among the very first of our aids to morality, because , if rightly studied and appreciated, it refines the tastes and makes the man less capable of coarse sinning, while used as a means of education, it keeps before the eyes and fastens in the mind the highest illustrations of purity, goodness and beauty.

As an educator for the body alone, art is worth introducing into every family, for there is no doubt that as a nation, Americans are sadly lacking in strength and grace of body, and there is not a household of young, growing children in the East or West, which would not profit, physically, by the daily observation of such figures as the Venus of Milo, the young Apollo with the lizard, or the Meleager of the Vatican, while the Venus di Medici would be a vivid object lesson to many a young girl who is dwarfing and deforming the figure which Mother Nature gave her by the wearing an article of dress which is worse than an eating cancer, because, as usually worn, it is eating the life and vitality out of half of the women in the land. A walk down Main Street in Kansas City is a painful experience to any one possessing a general idea of the internal structure of womanhood, together with even a moderate admiration for the soft flowing outlines of a well developed womanly form, for such a procession of coffin-shaped incapa-

bles as takes up its line of march there, would have driven Praxiteles mad! The expression, "coffin-shaped," is used advisedly, for the regulation womanly outline, which the fashionable dressmaker manufactures, refusing to fit a woman who will not allow herself to be so metamorphosed, is more like that of a coffin than anything and is as far removed as a coffin from all the bloom and beauty of nature. It is useless to talk to a woman who possesses this form, about her health, for in nine cases out of ten a fashionable woman prefers appearances to health. But convince her that she is not beautiful in this guise, so educate her taste that she recognizes the absurdity of her figure and apparel, and the battle of health and maternity would be won without a struggle. This is one of the things which art culture can do for America, and it is a thing so imperative that it would be worth the while of every father who possesses a family of blooming daughters, to invest a good share of his patrimony immediately in "casts"—cast of the beautiful old Greek sculpture which would teach his daughters how much nobler it is to stand before the world as large brained and perfectly developed women, than to cramp heart and soul to an ideal which can never go beyond the dressmaker's art.

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# ARCHÆOLOGY.

## THE LOST ATLANTIS.[1]

MRS. H. M. HOLDEN.

If civilization be an inheritance, from what parent nation came the ancient skilled races whose handiwork and high civilization are traced with unmistakable identity from the Mediterranean nations of the Eastern Hemisphere to Mexico, Central America, Peru, and the mounds of the Mississippi Valley of the Western Hemisphere?

In the marked similarity of their traditions, religious beliefs, arts, customs implements, and weapons—is not some common source, some original home indicated?

Many inquiries are being pressed concerning the earliest people of the western world. A recent writer introduces his article with this question: "From what far off land came the primal pioneer to the shores of America?" And another: "Who were the earliest inhabitants of America?" Our savage red man no longer furnishes an answer to these questions. He is but the degraded relic of a noble ancestry whose arts and high civilization are traced back to the same period as that of the earliest civilization in the Old World. From a strict archæological standpoint the terms Old and New World are inapplicable as referring to the Eastern and Western Hemispheres. All historical students have

1. Read at the Social Science Convention of Kansas and Western Missouri, Nov. 7, 1884.

grown away from the idea that Columbus discovered a new world or continent. He but re-discovered an old one.

A writer in the *North American Review* finely expressed it: "The hands of the geological clock pointed to the same hour on both sides of the Atlantic." And that "the story of early man in America is but a part of the same and greater story of his first appearance on the earth."

Retrograde periods in the progress of races being conceded historical facts, we now ask the cause of the retrograde condition of the red man at the dawn of our history, and submit to the following answer, to-wit: They had lost all intercourse with their "parent land—their "first world"—"the drowned island"—"the lost Atlantis"—by the deluge as recorded in sacred and profane history. When the island sank into the sea the path of commerce was closed for "a lapse of 6,000 years." That this island did exist and was the cradle of civilization at a remote period, and was swallowed up in a great convulsion of nature, may yet, to many, seem legendary instead of authentic history, but, says an able writer: "There is an unbelief, which grows out of ignorance as well as a skepticism which is born of intelligence." Herodotus, it is said, was called "the father of liars" for his accounts of the wonders of the ancient civilization of the Nile and of Chaldæa. For a thousand years the stories of the buried cities, Pompeii and Herculaneum, were regarded as myths, but are now accepted facts in history, and cannot we, in turn, accept the testimony of eminent scholars whose lives are devoted to research, and to whom we are indebted for the historical knowledge we already possess? Even as Herodotus incurred the derision of his time, and in later times was held in high esteem by Schlegel, Buckle and their peers, so Plato's story of Atlantis, long considered fabulous, is now being interpreted as authentic history. And, says Ignatius Donnelly, "if confirmed by farther investigation, it will prove to be one of the most valuable records which have come down to us from antiquity."

In this new era for legends, does it seem otherwise than conclusive that in in an age before there were written records, marvelous events and heroic deeds should be handed down from sire to son, and, as years rolled on, be regarded as myths and "folk-tales"? An illustration of this view occurs in the dialogue between Critias and Socrates, in Plato's History of Atlantis. Says Critias: "Then listen, Socrates, to a strange tale, which is, however, certainly true, as Solon, who was the wisest of the seven sages, declared. He was a relative and great friend of my great grandfather, Dropidas, and Dropidas told Critias, my grandfather, who remembered and told us, that there were of old great and marvelous actions which have passed into oblivion through time and the destruction of the human race." In another place Critias says: "I will tell an old world story, which I heard from an old man, who was ninety years of age." Thus, it seems that the origin of legends might be traced back to a narrative of actual events.

The verification of Plato's legend is based on both ancient and modern evidence. From the striking identity in the traditions of the ancient nations on both sides of the Atlantic—each having a flood legend concerning a "lost island

in the sea," and this location of the island corresponding so accurately in each instance, modern scholars readily conclude that the Azores Islands in the Atlantic Ocean, west off the Straits of Gibraltar, are the mountain summits of the engulfed island. Their conclusions are based on the investigations made by different nations. In 1873, deep sea soundings were made by her majesty's ship "Challenger." In 1874, by the German frigate "Gazelle," and in 1877 by Commander Gorringe of the United States sloop "Gettysburg." Each investigation bears corroborative proof of the other. As stated, they mapped out the bottom of the Atlantic, discovering a great elevation of land in the exact location of Atlantis, as described in ancient legends. This elevation rises about 9,000 feet above the depths around it. And a writer in the *Scientific American* of July 28, 1877, says: "This elevation must have been once dry land, as its mountains and valleys could never have been produced in accordance with any laws for the deposition of sediment, nor by a submarine elevation, but on the contrary must have been produced by agencies acting above water level." The sea soundings further revealed that there were ridges of land connecting the island of Atlantis with Europe, Africa, North and South America. These ridges, says an English geologist, were but the skeleton of an ancient continent that once occupied the space of our Atlantic Ocean, and the island Atlantis was a remnant of this buried continent. These ridges, forming land communications between the two hemispheres explain the identity in the animals and plants. From able accounts, it has been proved that the horse originated in America; and in his wild state could never have been found in Europe and Asia but for these pathway ridges of land. We also read that the fossil remains of the camel are found in India, Africa, South America and in Kansas, and that the remains of the cave lion of Europe have been discovered in Natchez, Miss. Hence, the fact of the same species being found on both sides of the Atlantic indicates that they roamed from a common center. There are numerous other instances of absolute identity, but the limits of this paper forbid their mention.

The same similarity exists in the floral and vegetable kingdom. Otto Kuntz, a distinguished German botanist, says that the banana was found in America before the arrival of Columbus, and that before a plant becomes seedless it must have been under cultivation for a long period of years. He mentions other plants that could only have been transported by bulbs and cuttings, and that by the hand of civilized man—which again supports the theory that the colonies from Atlantis carried them to the east and to the west.

The race identity of the two hemisphere bears even stronger evidence of a common and an original home than the testimony of the flora and fauna. A writer in the *Magazine of American History* says the American Indian uses the same terms in his river names that were used by all of the aggressive races that over-ran and colonized Europe, Asia and Africa. Also, "the Indian names of our rivers belong to a period when one common language was known—when one dominant race ruled throughout the entire length and breadth of America." By analysis, the geographical nomenclature of the two hemispheres can be readily

traced by its roots or germs from one nation to another. From an extensive list we give a few instances: Genesee of New York, and Yenisei of Siberia, have the same origin. Saratonka of Russia corresponds with our Indian name Saratoga. Kyogia in Africa, with Cayuga in New York. The Indian name moose is moosa in Europe and Asia. Thus, continues the aforementioned writer, "we may be able to trace the Indian back through all of the historical eras represented by the Hebrew, Sanscrit, Celtic, Phœnician, Arabic, Persian, Indo-Germanic and even through the Greek into the bosom of the Roman." And, we will add, still farther, into the heart of Atlantis.

Modern culture, for many generations, paid generous tribute to Greece and Rome as the fountains of learning, but of late years the antiquity of Egyptian culture and magnificence is engrossing the interest of students of ancient history. Says one of these, "If ever full justice is done to the achievements of a vanished race, Greece and Rome will look small as compared with Egypt." "The people who made her what she was, and what she can never be again, have disappeared forever."

Modern Egypt bears not the faintest resemblance to ancient Egypt, before she was stamped out by the Persian, Arab, Roman and Turkish conquerers.

She was in the zenith of her learning and splendor, when all Europe was a savage wilderness. She possessed a highly organized social system when the rude savages that roamed over the sites where now are situated London, Paris and Berlin were engaged in fetich worship. And, at a much earlier period Grecian scholars went and sat at the feet of Egyptian masters. Woman's status, says eminent authority, was as high in the earliest days of Egypt as now in Europe and in our own country.

Historians give us no beginning or infancy for Egypt. She appears on the horizon of history in matchless maturity. Before the time of her first king, Menes, whose reign according to Lepsius, was 3,892 years B. C., Egypt was a "highly organized and governed community." Winchell says "her people had long been architects, sculptors, painters, mythologists and theologians before the era of Menes." We now ask, from what fountain greater than herself drew she this marvelous greatness? And as we progress, we continue to step backwards and answer, Atlantis.

That under the waters of the Atlantic Ocean lies the "parent nation" of grand old Egypt seems incontrovertible as we read the testimony of late researches on this subject. So, also, do ancient Mexico, Peru, Central America, and the mound-builders of the Mississippi Valley look back to buried Atlantis for the graves of their an cestors.

How can the extraordinary similarity of these prehistoric American nations to ancient Egypt, separated by so vast a distance of land and sea, be accounted for if they did not migrate from a common home? For we read that "the pyramids of Egypt are duplicated in Mexico, Central America, and Peru. As, also, are the temples, palaces, public works, agriculture, sculpture, painting, language and religion. And that Peru had invented suspension bridges thousands of years

before they were introduced into Europe." Humboldt pronounced the Peruvian roads among the most useful and stupendous ever executed by man. Her vast wealth and high civilization, in addition to the race and tongue similarities, give her rank with ancient Egypt as a sister colony from Atlantis. The mound-builders are identified with the bronze age in Europe, which age has furnished perplexing problems for European scientists. A bronze age implies a pre-existent age of copper and tin before the art of combining them was known, but the relics of such a period have not been found in Europe. Sir John Lubbock says in his "Pre-historic Times" that the absence of implements made either of copper or tin seems to indicate that the art of making bronze was introduced into, not invented, in Europe. The ancient Mexicans knew the art of making true bronze. Their identity with the Mound-Builders is easily established, and both are traced by their language and legends to Atlantis—hence what people but the Atlanteans, whose ships, docks, canals and commerce provoked the astonishment of all who felt the aggressions of their powerful and populous island, supplied all Europe with bronze in the bronze age!

Ignatius Donnelly says that "In 6,000 years the world made no advancement on the civilization it received from Atlantis—that modern civilization is Atlantean, and the inventive faculty of the present age is but taking up the thread of original thought where Atlantis dropped it thousands of years ago." We stand with abated breath at the startling assertions, but the evidence gleaned in their favor must be withheld, as we find, at the expiration of our time, that we are but on the threshold of our subject, and to tempt you to press on and into the subject, we give you a few hints of the feast that awaits you.

"That all of the ancient civilized nations of both hemispheres were colonies from Atlantis,"—"the land of the master race."

"That the gods and goddesses of the ancient Greeks, the Phœnicians, Hindos and Scandinavians were the kings, queens, and heroes of Atlantis."

"That Atlantis was the original seat of the Aryan or Indo-European family of nations, as well as the Semitic and possibly the Turanians."

"That Greek mythology is a confused recollection of real historical events."

"That the Phœnician alphabet, the parent of all alphabets, was derived from the Atlantean alphabet" and the Maya language spoken by the ancient people of Yucatan is the survival of the Atlantean alphabet.

A writer in the *Scientific American* says the last words of our Savior were in pure Maya tongue. "Eloi, Eloi, lami sabacthani" in that tongue is,—Now, now I sink; darkness comes over me." The bystanders, not understanding his language, thought he was calling on the Father in his hour of trial.

To resume: Genesis is said to contain a history of Atlantis, and that the sinking of this island was the scene of the Biblical deluge. That there was no gulf stream previous to this catastrophe.

"That this great event was the terminus of the glacial period, the barricade being removed, the "land locked ocean" of the north met the heated tropical waters, and produced climatic changes in Europe, and but for the mild waters of

the gulf stream flowing around the submarine elevation of the buried island, it is said the British Islands would scarcely be habitable.

Thus the authentication of Plato's story opens up a wide field for new thoughts in the scientific realm as well as that of secular and sacred history, and we may grow into the belief that as once "All roads led to Rome," now all lines lead to Atlantis!!

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## BURIED CITIES.

All that tread
The globe are but a handful to the tribes
That slumber in its bosom.

So wrote the pensive Bryant, and every year since has but emphasized the saying. Of the numbers of the human race in past ages we can form but little idea, even from estimates, and it is almost equally difficult to conjecture the number, size and importance of the buried cities which exist in every part of the earth. Even in this country, where everything seems so new and fresh, cities are built upon the ruins of their predecessors, these having been buried so long as to leave not the least indication by which their inhabitants can be identified, and we are, therefore, left in utter ignorance who they were, whence they came and what became of them. In this part of the continent their cemeteries remain so extensive as to indicate a vast population, and in the valley of the Ohio and its tributaries their fortifications of comprehensive plan and vast extent are still to be seen, but that is all. In Mexico buried cities are found in such numbers as to give a most exalted idea of the wealth, numbers and character of population that could crowd into the country; while in Central America and Yucatan, it has been said that buried cities are more numerous than living inhabitants. This is probably an exaggeration, but the explorer may well be excused for a liveliness of imagination when he finds it almost impossible to penetrate the jungle a mile in any direction without coming upon the ruins of a little fortified town, a palace or a temple. In Peru and along the west coast of South America, buried cities are far in the majority over the cities of the present day. The difference between these buried cities of the American Continent and those of the Old World is found in the fact that the latter have a history while the former have none. If we could trace the history of the cities of our own continent back to the date of their founding, and recall the names of the now unknown heroes whose exploits made themselves and their cities alike famous, we would naturally feel a pride in the ruins of America such as is now felt by an intelligent Greek in the ruins of his own country. But this is not only at present impossible, but there is little likelihood of its ever being done in the future. The American races were not remarkable for their records, and we have, therefore, small prospect of the recovery of much, if any more of the annals of ages which preceded our own.

The ancient cities of Egypt are, for the most part, buried literally as well as figuratively, as the annual overflow of the Nile brings down from one to eight inches of sediment, and this is deposited over the entire valley. When the cities were inhabited, the floods were kept from them by means of dikes, but after war and pestilence had depopulated the entire country, the river every year swept over palace and temple and tomb, and now the cities of the Pharaohs must often be looked for under twenty feet of soil. The present city of Alexandria, for instance, is builded on the ruins of the city of the same name, founded by Alexander. This was, in its day, second only to Rome, had over 4,000 palaces and innumerable schools, colleges and art collections. It was the commercial center of the world, standing midway between the east and the west. In ancient as in modern times, it commanded the Suez Canal. This is no new enterprise of our own times. It is recorded that a canal was cut between the Red Sea and the Nile by Rameses II., B. C. 1344, though some historical records place the date a century earlier in the time of Joseph. Herodotus tells of the enlargement of this canal 800 years later; the Emperor Trajan, still later, again restored it, and it was kept open till destroyed by the Arab caliphs. A few miles south of Alexandria is Cairo, and a little south of Cairo are to be found the ruins of Heliopolis, a city known in Scripture as On. Here was once the great Temple of the Sun, where the Phœnix was consumed; here Moses was educated and many centuries later Plato and other distinguished Greeks. Of this vast city, but one stone, an obelisk seventy feet high and six feet square at the base, remains standing. The rest is beneath the alluvium brought down by the Nile. Near the old obelisk is the "Fountain of the Sun," the only living spring in Egypt, which furnished the temple with water 4,000 years ago. Not far from Helipolis are the Pyramids, of which seventy are still standing in the Nile Valley. The base of largest of these covers considerably more ground than four St. Louis squares, and the pyramid is more than three times as high as the court house dome. The latest theory in regard the great Pyramid is that it was built by order of Joseph during the seven years' famine to find employment for the people; that he was buried in it, and that the huge empty sarcophagus found in its innermost chamber once contained his body, which was removed by the Hebrews when they left the country.

A little south of the pyramids is Memphis, the Noph of Scripture, founded by the first king who ever ruled over Egypt, and for a thousand years the capital. Here Joseph ruled and Pharaoh dwelt, and here all the magnificence of the old monarchy was displayed. The embankments which once protected the city against the river have long since been swept away, and the alluvial deposits of twenty centuries have covered from sight almost every relic of past grandeur. When the English army takes its course up the Nile next month the soldiers will see a few blocks of granite, one or two mounds of sun-dried brick and the fragments of a colossal statue of Rameses II., lying with the face in a pool of water, as if ashamed of the present condition of the country. This statue was almost entitled to be considered one of the wonders of the world. It was over fifty feet

high, cut from a single block, and computed to weigh over seventy-five tons. Back of the spot where once Memphis stood lies the largest and oldest cemetery in the world. It is over twenty miles long, from six to eighteen miles in breadth, and is estimated to contain the remains of not less than 25,000,000 people. A recent writer says that it is impossible to go 100 feet without seeing skulls or other bones, while the limbs of mummies here and there protrude from the ground. In the limestone rock that underlies the desert everywhere there are innumerable pits, evidently for the burial of the middle and lower classes, and in these the bodies are stacked up like cordword, six or eight courses deep, all carefully embalmed, and looking as fresh as if placed there yesterday. The most revolting thing about the present condition of the cemetery is the fact that the natives of the country may be seen any day using the bodies of their ancestors for fuel and then employing the ashes to fertilize their fields. In this cemetery are also the burial places and sarcophagi of the sacred bulls of the Egyptians. Hundreds of these sarcophagi have been unearthed, each sufficient in size to contain the body of a large bull, and each hewn from a single block of granite. The temple which once stood over the vaults containing the mummies of the bulls was for ages buried under seventy feet of sand, but has recently been unearthed sufficiently to show its great extent and what must have been an unexampled splendor. The secret of the remarkable care in preserving the bodies of both man and beasts is found in the fact that the Egyptians regarded this life as transitory, but the grave as an eternal abiding-place.

The English army, from the day of its entrance into Egypt to its arrival at Khartoum, will steam through a continual double line of buried cities on both sides of the River Nile. After Memphis, with its great cemetery, has been passed a number of smaller cities follow each other in quick succession, their local names and traditions being well preserved, but there is no place of great importance until Thebes, 600 miles from the sea, is reached. This was the capital of Upper Egypt, was built on both sides of the Nile, and from the numerous canals seems to have been a sort of ancient Venice. The remains of two huge temples comprise all that now remain of the city, which take their names from two local villages, Karnak and Luxor. The Exposition building at New Orleans covers, it is said, an area of nearly thirty acres, and is a temporary building of glass and iron, but the great temple of Jupiter Ammon at Karnak had a covered area of forty acres; the temple enclosure was ninety acres in extent, and of all the thousands of columns that enter into the structure no two are alike. There were many halls in this temple 350 feet long by half that in breadth, and the entire edifice, in extent and grandeur, it is believed, surpassed any other creation of man. It is especially to be remembered that this triumph architecture was erected in the days of Joseph, and was the center of a system of smaller temples which surrounded it for several miles in every direction. The frontier city of ancient Egypt was Assouan, the present city of this name being built on its predecessor, which lies many feet beneath the sand. The old Assouan is specially famous for its inscriptions, many important records having been recov-

ered here. Near the city is the Island of Philæ, the last resort of idolatry in Egypt and in the Roman empire. Here Isis and Osiris were worshipped for over an hundred years after the imperial decrees abolishing the old religions and substituting Christianity in their stead. The most wonderful thing about all the Egyptian ruins is the apparent ease with which the ancient architects and engineers handled the huge blocks of granite, as if they were no heavier than so many bricks. The utter worthlessness of human life and effort in those days is shown by the excessive labor bestowed on the statues, columns and other monumental works, the cost of which to-day, at our present rates, would exhaust the treasury of all the powers of Europe.

Arabia Petra, or the Rocky Arabia, was until comparatively recent times, believed to be a desert even more uninhabitable than the sandy districts, but the investigations of the present century have shown that it once supported a vast population and had a great number of strongly fortified and peculiarly built cities. About four years ago Captain Burton was sent out to explore the region east of the Red Sea and found the lost cities of the Midianites, mentioned in Scripture, and near them very extensive gold mines, which bore evidence of great antiquity, and less than two years ago he took out a colony to re-occupy these cities and work those mines which he considers to be the veritable Ophir of Solomon's time. Petra was first inhabited by cave-dwellers, who gradually improved upon their excavations until the ruins of that district are now among the most remarkable relics of the past. Temples, tombs, palaces, fortifications, and private dwellings are all, without exception, excavated from the sides of high cliffs, and thus form unique structures, the like of which is not elsewhere known. The peculiar architecture is suggested by the character of the country, which is rent into vast chasms 200 or 300 feet broad, and having perpendicular sides of sandstone and limestone. The great cities of this region are always in these chasms, and the ruins of the rock-hewn edifices extend often for many miles. Passing through Arabia and entering Palestine the most notable list of buried cities is found in the capital. The heights of Jerusalem were first held by the Jebusites, who had a fortified city there; then taken by David, who destroyed the city and built another on its ruins. Since then the city has passed through many sieges, and has been time after time destroyed, another rising on its ashes, until the original Jerusalem of David is now many feet underground. The city has been held in turn by the Jews, Assyrians, Persians, Egyptians, Greeks, Romans, Saracens, Crusaders, and Turks, and each change of government was attended with more or less violence and destruction of property. No less than six Jerusalems, one above the other, have been counted by those who sink their shafts for the purpose of making scientific examinations of the ruins. The workmanship of the Jerusalem of Solomon's time bears favorable comparison with that of Greece, Rome or Egypt. In the temple platforms there are found blocks of solid granite forty feet long, ten feet broad and six feet thick, laid upon each other, and fitted so nicely that it is sometimes almost impossible to discover the joint, increasing our amazement at the engineering skill that

could accomplish such wonders. It is impossible to dig a well in any part of the city without having to pass through broken columns, walls, streets, and ruins of every kind for nearly 200 feet before coming to the original soil.

Palestine is almost as much a country of buried cities as Egypt. Some of the most notable of these are the remains of cities rebuilt by Herod the Great, who was an indefatigable architect and levied the most merciless taxes on his people in order to build palaces and monuments to his own vanity. Among the most notable of the small but magnificent cities he built were the Herodium, a fortified country seat, and Machaerus, beyond the Jordan, a palace with surrounding houses, infamous under a later Herod as the scene of the murder of John the Baptist. Hebron, the City of Abraham, is now identified chiefly by the cave in which, according to tradition, lay the bones of the Patriarch and his family. Quite as interesting are the long buried and forgotten, but recently recovered cities of the Philistines, which, though occupying a territory only about half that of St. Louis County, fill more pages in Biblical history than many numerously populated capitals. The Philistine cities are remarkable for the massiveness of their ruins, the doorways being constructed usually of three huge stones, two perpendicular, and the third laid across them. Acre, in all ages celebrated for its strength, was the point where Napoleon received his first check in his Egyptian expedition, and the ruins of half a dozen cities here lie one above the other, while Cæsarea, in the time of Paul the capital of Judea, was lost for ages, and recovered only through the fact of the name being retained in the local traditions of the Bedouins. Jericho, so famous for the concert performance of the trumpets was lost from that day, and to the present can not certainly be located, but is not alone in this respect, since there are hundreds of other cities in Palestine whose history we know better than their geographical position. The most notable of all, however, are the Cities of the Plains, which were destroyed by volcanic eruption when the Dead Sea was formed. Deep down beneath the Dead Sea ruins of great extent may still be seen, suggesting that these cities were not only large but densely populated also, while the character of the surrounding country all goes to show that the Biblical account of the catastrophe was substantially correct. America is not alone in having ruins which possess neither name nor history. Such wonderful cities as Nineveh and Babylon, and the extensive cities of Persia and Mesopotamia are lost and found, and books are printed by the score about them, while moralists muse over the fate of the nations who once rejoiced in them; but it is infinitely more saddening to remember that ruins, covering many square miles have been found in the regions of Western Asia, showing the existence of vast populations who have perished from history so absolutely that not even a name or a trace survives. The land of Moab, east of the Jordan, is full of cities for hundreds of miles, but not a name remains to tell of those who built and inhabited them. On Mount Nebo there are the ruins of a great city not laid down in any map; who built it, who lived in it are unknown. The northern part of Palestine is almost equally rich in ruins which antedate the time of the Jews, but no antiquarian is able to assign hem either a date or a population.—*Globe-Democrat.*

# ASTRONOMY.

## SUN AND PLANETS FOR DECEMBER, 1884.

W. DAWSON, SPICELAND, IND.

As stated in the November REVIEW, the Sun's R. A. on the 30th was 16 h. 27 m. Hence on December 1st it will be 16 h. 33 m.; and on 31st 18 h. 46 m. The increase being somewhat more than four minutes a day is caused by the Sun moving faster on account of being nearer the Earth than it was near the middle of the year—speaking of *apparent* motion caused by real motion of the Earth. On December 21st at 4 o'clock in the morning the Sun's R. A. is just 18 h.; when it is farthest south (23° 27′). This is the shortest day, and the beginning of winter season. It will be 9 h. 10 m. long in 40° north latitude—longer south of this latitude, and shorter north of it.

At this writing (November 8th) the Sun appears again without spots—the third time in more than four years. The other two times were February 23d and May 27, 1883.

Those who study the westward motion of the stars will observe new constellations in the east week after week; and occasionally a planet appearing earlier than it did in the Autumn time.

On December 1st, at 7 P. M., the Pleiades are three hours high; Aldebaran nearly one hour below; and the Belt of Orion just rising in the east. Capella is away north of the Seven-stars, and Saturn below—making nearly an equilateral triangle with Pleiades and Capella. Jupiter rises about 11 P. M. during the first week of December; being a fine morning star. Venus rises about 4 A. M.—still bright, though waning. Mercury is an evening star this month; being at greatest elongation east on the 17th when it may be visible to the naked eye, though too far south (of west) to be conspicuous. It will be in conjuction with Mars on the 4th and also on the 29th.

The Moon will pass over a fourth magnitude star near 8 P. M. December 4th, and another one near 7 P. M. on the 22d. Both these will be interesting phenomena; and may be observed with very small telescopes—if the sky is clear.

# METEOROLOGY.

## THE PANAMA CANAL AND ITS POSSIBLE INFLUENCE UPON THE OCEAN CURRENTS AND UPON CLIMATE.

M. O. BALDWIN, M. D.

Referring to the above topic it is hardly necessary to say that the attention of the whole civilized world is, and deservedly so, directed at the present time to this great work and the benefits to commerce and civilization which will result therefrom.

It is not the purpose of the writer to treat of these, but to direct attention to the possible physical changes upon the earth's surface, which may be brought about by the completion of this canal.

The surface of the ocean on the Pacific side of the Isthmus is about fifteen feet higher than it is on the side of the Atlantic. This elevation of the waters of the Pacific above those of the Atlantic is maintained, it is probable, by the peculiar direction of the Pacific Ocean currents, which, while they carry forward to this point very great bodies of water, impede, and to a great extent, obstruct their return. The consequence of this must be that upon the completion of the canal, which is to be, it is understood, a tide water canal, there will be created a current from the west eastward, through the Isthmus.

The length of the canal will be about thirty-three miles, consequently there will result a fall approaching closely six inches per mile. The pressure of so great a body of water as is found in the Pacific, will give to this current in the canal a much greater rapidity than will exist in the current of a stream wherein we have the same degree of inclination. The result of this will be that the shores and bottom of the canal will be rapidly cut away.

Now let us consider briefly the currents of the ocean. There exists in the Pacific Ocean the great Japanese current, which sweeps from the coast of Japan northward and is divided upon the Aleutian Islands, on the coast of Alaska, a portion passing through Behring Straits and a portion finding its way down the western coast of the continent as far south as Central America, where it is deflected westwardly to join and again return with the currents from the South Pacific which are diverted from Australia and the Phillipine Islands and form a current which passes directly eastward to the Isthmus of Panama. This current in its passage eastward is joined by yet other currents from the great South Pacific currents which sweep up the west coast of South America, and together these form the great equatorial counter-current, and the entire force of this mighty stream is broken and expended upon the western shores of the Isthmus.

It is an evident condition that these ocean currents are directed in their course by the coast barriers with which they are brought in contact. If then, these barriers are by any means removed or changed, there will result a corresponding change in the direction of the currents.

We have then this condition, with the waters of the Pacific already at a considerable elevation above those of the Atlantic, a current from the west eastward seems inevitable, and with the added force which will be thrown in by the currents from the Pacific, the canal must be rapidly worn away until it is probable a considerable portion of the Isthmus will have been destroyed, and the great Pacific current, the force of which is now expended upon the western shores of the Isthmus, will find its way through into the Gulf and be joined to the Gulf Stream.

Should this be the result we can only expect that the great thermal currents from the Pacific, which have heretofore so greatly modified the climate of our Pacific Coast will undergo a change in their directions and the great body of heated waters finding its way through the Isthmus will pass northward with the Gulf Stream along our Atlantic Coast until it is directed upon the coast of Newfoundland and crossing the Atlantic it passes the shores of Great Britain and Iceland, expending itself and upon the frigid shores of northwestern Europe, will carry with it an elevation of temperature which will modify to a great extent the climate of those regions.

It is a well known fact that an extended portion of the Arctic world has been at some time habitable and inhabited. This is shown by the finding so frequently the remains of tropical plants and animals in the far north. It is equally known that great convulsions of nature have taken place whereby continents and oceans and ocean currents have been changed, and these conditions have brought about these great changes in climates. It cannot then be considered an unreasonable hypothesis, that the results which have followed natural causes shall also succeed artificial means when the elements necessary are at hand.

Permit a digression, to direct attention to the fact, as has been indicated above, that the current of this canal will be such that in the course of time it will result in the destruction of a considerable portion of the Isthmus. In that case the canal company will find a difficulty in making the investment a source of profit, as the canal will soon have overreached their boundaries, and will become a public highway, a great waterway for the shipping of the world.

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## THE ATMOSPHERIC HAZE OF 1883 AND 1884.

W. H. PRATT, DAVENPORT, IOWA.

The long continued prevalence of the "red skies" constitutes a phenomenon which at least in point of duration is quite unprecedented. As the months pass and this wonderful effect has not faded away as was expected, the subject assumes

a deeper significance and greater interest, and it is felt that the theories advanced and ably maintained by prominent astromomers and physicists are probably insufficient and untenable.

It was known from actual observation that clouds of volcanic dust could produce, temporarily, various and brilliant colors in the atmospheric reflections. It seemed possible, even plausible, that a comparatively immense volume of such dust projected into the atmosphere by the Krakatoa eruption, might remain suspended for a considerable period, gradually settling to the earth and the effect entirely disappearing within a few months. Such, however, has not been the case.

Over twelve months have passed and although the intensity and duration of the "afterglow" subsided considerably after two or three months, it has since that time continued with considerable uniformity. The dust theory has been largely supported by the discovery, as reported in different localities, of dust similar in appearance to that from the volcano, but we should not forget that this "meteoric dust" had been collected and examined in many places long before the outburst of Krakatoa. The coincidence in point of time—these appearances having commenced soon after the terrible convulsion—has perhaps been in reality the principal reason for attributing their origin to that event.

The fact of the observation of the phenomenon successively at points more and more remote westward from the Indian Ocean has also been cited as favoring that view; but such progression in the phenomenon would probably be the case whatever the cause which produced it, and the observations are too incomplete and uncertain to be at all conclusive. It is becoming very difficult to believe that the bowels of the earth have been so suddenly emptied to such an extent as the phenomena would demand upon that theory, or that the pulverized obsidian or whatever the discharge may be, could remain permanently in suspension. It therefore looks as if that theory must be abandoned.

One other opinion has been advanced and strongly advocated by a few scientific and many very unscientific writers, viz: that the phenomena are due to the presence of aqueous vapor in the atmosphere. They seem, without exception, to have quite forgotten that the same appearances have not been of common occurrence hitherto and must therefore be accounted for if at all, by some new or very unusual conditions.

A communication published in the November number of the REVIEW advocates this view. The writer assumes that the coloration is produced wholly by the moisture in the atmosphere, and curiously enough, that the *less* the quantity of moisture, the *greater* the effect produced! That would seem to be sufficient at once to settle that theory so far as his argument is concerned. His first remark also, concerning the "great commotion" produced in the scientific world, though greatly exaggerating that "commotion," shows that he is aware that the event is something new and altogether unusual, which aqueous vapor in great and small quantities certainly is not. Mr. Noyes suggests no recent change in terrestrial conditions except the development of the modern "Weather-Map." This, as he

very justly remarks is "a new thing." "One of its special beauties" he adds is "that it shows that nature is never twice alike." It will probably occur to every reader that he has heard that remark before the Weather-Map was brought to its present perfection; that is not a new revelation by several thousand years, and in fact has been a truism in all ages.

Doubtless the Weather-Map as now drawn gives a very instructive, graphic representation of the conditions of the atmosphere and the progress of storms, but it is no disparagement of its excellences to say that it has not produced the remarkable sunsets and sunrises and hazy skies of the past year. nor has it at all explained their sudden appearance and continuance, nor their non-occurrence in previous years. He remarks that "here the year 1883 was conspicuous for a prevalence of high-barometer." How then did the color-effect not appear until the last two or three months of that year, the highest monthly averages of barometer of the year having occurred in January and February, seven or eight months before? And why continue ever since?

In fact, however, the Signal Service record at Davenport shows the average height of barometer for eleven years next preceding January 1, 1883, to have been 29.368 inches, while for the year during which the color displays have prevailed, viz.: from November 1, 1883, to November 1, 1884, it has been 29.362 inches; six one-thousandths of an inch *below* the average of those eleven years. That seems to dispose of the theory of "High" as a producing cause.

Doubtless the extremes of maxima and minima of barometric pressure and atmospheric humidity have been as great during the past ages when there were no instruments to measure, nor "Weather-Maps" to illustrate them, as recently, and, as like causes produce like effects, had these conditions been adequate to produce the phenomena, the latter could not have been unfrequent.

The wonderful phenomena in question indicate a sudden and permanent, or at least a lasting change in the condition of our atmosphere, for the origin of which we should perhaps look beyond terrestrial operations, either to peculiar cosmic circumstances or to the progress of some secular changes in our system. When we remember that there are thousands of comets and unnumbered nebulæ, both of which vary from masses of immense extent and brilliancy to such as are scarcely observable with the most powerful instruments, we must believe that there are still almost infinite numbers of masses of nebulous matter, such as that of which comets are composed, not of sufficient size and not as yet sufficiently condensed to become visible. Judging from the comets themselves we must conclude that these small and highly rarified nebulæ are moving through space in all directions. Under these conditions it would be scarcely strange if one of these stray masses should sometimes come so near one of the planets as to be arrested in its flight, and compelled by the mighty power of gravitation to accompany its captor. Indeed, it would be remarkable if this should not sometimes occur.

Should the earth in its course pass near one of these highly attenuated bodies

whose momemtum is almost nothing, the latter must necessarily be caught in our atmosphere and carried along with us. If the repulsion between its particles which had hitherto prevented condensation continued to exist, the filmy mass would gradually spread through or over the earth's atmosphere, attending it as an envelope for some indefinite period, perhaps ultimately to be wholly absorbed. This cosmical matter floating in the upper air or above it would doubtless affect the sun's rays by reflection and refraction as well as directly obstructing them to some extent. It might also modify the structure of the atmosphere itself so as to cause the ordinary constituents of the air to act differently in the transmission of light. That it does constantly obstruct, decompose and reflect the sun's rays in a considerable degree is plainly shown by several facts which are matters of common observation.

1st. On all days when the sky is free from clouds or nearly so, the whole atmosphere in the vicinity of the sun's direction and to the extent of sixty or ninety degrees each way, including fully one half of the visible heavens, shows a whitish haze of dazzling brightness near the sun and diminishing gradually in all directions. On the clearest days this halo around the sun takes a more decided form and color: immediately around the sun an area of intense whiteness, surrounded by a broad ring of reddish brown color. Having spent the past summer on the dry plains of Dakota I have observed the above described appearance very strongly marked throughout the season.

2d. The portions of the sky more remote from the sun and opposite to it have *never*, during the past twelve months exhibited the clear "ethereal blue" so common and so beautiful in clear weather at all seasons of all preceding years. It now constantly presents, at the brighest, but a dull bluish lead color, and

3d. This condition is further shown by the following from the report in *Science*, page 295, of the proceedings of the Astronomical Section of the American Association for the Advancement of Science at the recent meeting at Philadelphia. "One very interesting statement of Mr. Swift to the effect that there had not been a first rate clear sky since the red glows appeared a year ago following the Krakatoa explosion, bears out the general experience of workers in other observatories, especially those who try to see stars near the sun in the day-time."

Whether this remarkable condition of the atmosphere can be reasonably supposed to have any relation to the unusual continued mild and calm weather of the present autumn, is an idea that readily suggests itself, though it may probably be but a mere coincidence. This and many other related questions are as yet unsolved, and the whole subject has not by any means lost its interest.

## REPORT FROM OBSERVATIONS TAKEN AT CENTRAL STATION, WASHBURN COLLEGE, TOPEKA, KANSAS.

BY PROF. J. T. LOVEWELL, DIRECTOR.

The usual summary by decades is given below.

| TEMPERATURE OF THE AIR. | Oct. 20th to 30th. | Nov. 1st to 10th. | Nov. 10th to 20th. | Mean. |
|---|---|---|---|---|
| MIN. AND MAX. AVERAGES. | | | | |
| Min | 32. | 25. | 27. | 28. |
| Max | 75. | 79. | 77. | 77. |
| Min. and Max | 53. | 52. | 52. | 52. |
| Range | 43. | 54. | 50. | 49. |
| TRI-DAILY OBSERVATIONS. | | | | |
| 7 a. m. | 40 1 | 40.2 | 36.0 | 38.8 |
| 2 p. m. | 62.0 | 65.6 | 59.0 | 62.2 |
| 9 p. m. | 47.3 | 44.6 | 42.9 | 44.9 |
| Mean | 49.8 | 50.1 | 45.9 | 48.6 |
| RELATIVE HUMIDITY. | | | | |
| 7 a. m. | .904 | . . | . . | . . |
| 2 p. m. | .488 | . . | . . | . . |
| 9 p. m. | .805 | . . | . . | . . |
| Mean | .732 | . . | . . | . . |
| PRESSURE AS OBSERVED. | | | | |
| 7 a. m. | 29.108 | 29.185 | 29.148 | 29.164 |
| 2 p. m. | 29.170 | 29.178 | 29.123 | 29.157 |
| 9 p. m. | 29.157 | 29.173 | 29.133 | 28.154 |
| Mean | 29.233 | 29.179 | 29.135 | 29.182 |
| MILES PER HOUR OF WIND. | | | | |
| 7 a. m. | . . | . . | . . | . . |
| 2 p. m. | . . | . . | . . | . . |
| 9 p. m. | . . | . . | . . | . . |
| Total miles | 2105 | 1774 | 1939 | 5818 |
| CLOUDING BY TENTHS. | | | | |
| 7 a. m. | 4.8 | 2.1 | 4.4 | 3.8 |
| 2 p. m. | 5.2 | 2.0 | 5.1 | 4.1 |
| 9 p. m. | 3.8 | 1.2 | 3.7 | 2.9 |
| RAIN. | | | | |
| Inches | 3.2 | .05 | .43 | .80 |

The month's report here given embraces the period of least rainfall yet observed in any month of this year. October during its last decade was very pleasant autumn weather, frosts occurring on the 22d, 25th and 31st. The first snow storm occurred November 18th, but melted nearly as fast as it fell, but up to the 20th no freezing happened at this place which did any damage to root crops.

# ENGINEERING.

## AMERICAN AND ENGLISH CITY RAPID TRANSIT.

While we have been talking and arguing about speedy means of intercommunication in large cities, a necessity of modern times (not because large cities have not before existed, but because in these days of telegraphs and telephones, of stenographers and typewriters, the rapid interchange of thought and word begets a longing for as rapid transit of matter and of man from point to point), and have given to our own cities and to the world the American surface street railroad or tramway, the slightly more rapid cable road, and the somewhat speedier stilted steam road, our conservative British brethren have quietly studied out the question of demand and supply, of outlay and profit, and have gone on to construct a work which furnishes to their metropolis what we have longed for but feared to undertake—speedy, safe and convenient intramural transit. And, what is more, they have done it without interfering with public property or violating private rights.

The Metropolitan Underground Railway, which traverses the heart of the most populous city of modern times, has been undertaken by capitalists who did not conceive it to be their first duty to seize upon lands which had been purchased by the public for a specific purpose and divert them to another purpose without compensation to the owners of abutting property. They seem to have had the pluck and the foresight to realize that a judicious expenditure to enable them to own the land they occupy, and to construct an enduring work, will prove more remunerative in the long run than a more fragile construction, with the risk, besides, of having to pay damages for encroachment on private rights.

The last completed section of this magnificent work, from the Mansion House to the Tower, a distance of about three quarters of a mile, has been executed within the last twenty months, and runs "beneath residences, warehouses, and roadways, and in all the difficult labors of underpinning, propping and building there has not been a single accident." Enormous warehouses, containing iron safes and strong boxes, have been tunnelled under without disturbing their contents, and the statute of King William, which, with its pedestal weighs 179 tons, has been underpinned and rests on the arch of the tunnel. Large trees have been undermined and underpinned without removal or injury. The result is that there is a substantial roadway on which the heaviest trains can run at high speed, and passengers can go from point to point in London without creeping along at twelve miles an hour on a structure which sheds bolts and nuts and rivet-heads down on the heads of passers-by, and requires constant repairs, while the gas and smoke and noise offend the innocent dwellers alongside the line of travel.

We doubtless have engineers as capable to design, and builders as competent to execute such work as the Metropolitan Railway as any in the world, but we seem to need capitallists bold and far-seeing enough to appreciate the fact that what New York and other large cities need are permanent roads, fitted for real rapid transit, owning their right of way, and not interfering with public property or individual rights. Whether the structures should be elevated above or depressed beneath the surface of the ground is a matter of local adaptation and convenience, but the principles of absolute independence of ownership and freedom from complications, on the one hand, with structures owned by the public and maintained solely for their benefit, and on the other hand with rights and privileges acquired by private citizens, partly at public expense and guaranteed to them by the public.

The amount of city travel is proved by experience to grow in proportion to the facilities afforded for it. The construction of the elevated railroads in New York City has doubled the travel on the longitudinal routes in six years. The resources of the elevated and surface roads are now taxed to their utmost, and the necessity is pressing for more and quicker modes of transit.

It certainly seems as if a sensibly designed and honestly executed scheme ought to bring fair profits on legitimate expenses.—*Sanitary Engineer.*

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# GEOLOGY.

## CORRESPONDENCE.

PLEASANT HILL, MO., November 21, 1884.

EDITOR REVIEW, DEAR SIR,—In the REVIEW for November Prof. J. D. Parker discusses the Burlington Gravel Beds. As I have not been to that place I cannot discuss them. But if Mr. Parker will refer to Vol. III No. 8 p. 460 of the REVIEW he may be interested in an article of mine on "Surface Deposits of Southwestern Missouri and Southeastern Kansas" lying south of the marked limit of "glacial drift." I suppose the Burlington gravel must be of similar age to like deposits along the Neosho to the south, which I have seen. Most of the gravel that I have seen from those beds I can refer to the age of the Upper Carboniferous or Coal Measures. That of Kansas is certainly all of that age, and the gravel deposits all overlie the coal measures.

The gravel on the "Flint Hills" is generally angular or sometimes locally worn; that on the Neosho, Fall River, Walnut, the Valley of the Pottawatomie and the Marais des Cygnes is evidently water worn and the beds generally lie above all known high-water.

Similar deposits exist near the Marais des Cygnes in Bates County, Mo., and

on some ground of a little higher elevation in Bates, Vernon and Jasper Counties, Mo. In Jasper County it may be found on high ground near Carterville and near Carthage.

Deposits of northern gravel (rounded granite, quartzite, etc.) I have found south of the Missouri River in only St. Louis and Saline Counties. But isolated boulders are found near the Missouri River at many places. Rounded boulders of cretaceous and upper carboniferous are often found in the drift of northwest Missouri.

The Ohio and the Missouri I regard as the southern limit of the great northern drift (glaciers). West of the State of Missouri the line trends to the northwest and north.

G. C. BROADHEAD.

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# PROCEEDINGS OF SOCIETIES.

## KANSAS ACADEMY OF SCIENCE.

The first day's session of the Seventeenth Annual Meeting of the Kansas Academy of Science, was held at Lawrence on the 24th ult. The afternoon session was held at the parlors of the Eldridge house, and consisted first of a general business meeting, at which reports of committees were read and officers were elected, and secondly of a session for special business, at which action was taken in regard to the geological survey of the State and in reference to the publication of the proceedings. Reports on the condition of the museum and library were also read.

At the evening session in University Hall the president, Dr. R. J. Brown, of Leavenworth, delivered the following address upon the question :

### "IS A GEOLOGICAL SURVEY OF THE STATE A NECESSITY?"

GENTLEMEN OF THE ACADEMY OF SCIENCE:—In accordance with the custom and rule of this academy, the president is required to deliver an address at each annual meeting, upon some subject pertaining to the work of the past year or on the advancement and progress of science in our midst. In response to this the work and labor the members of the academy will be presented to you, as they have come fully prepared with papers of great value and interest, covering al branches of science, with new discoveries and new developments in every department. I congratulate the members of the association upon the success of their efforts to advance the interests of the academy. Time, labor and money have been expended to bring together so much original investigation and research that will be appreciated by scientists everywhere and by the people of our State.

We shall devote the remainder of the evening to something we deem of vital importance to our State. That is a geological survey of Kansas. If we can convince you and through you the great mass of our citizens that there is a necessity that such a work should be made, and that the benefits derived from it will be one hundred times the cost attending the same, our labor in bringing this subject before you will not be without some good results. This Academy was organized for the advancement and promotion of scientific knowledge. In pursuit of it a great many facts in regard to the resources of the State have been made public which have proved of great value to the people of this commonwealth. Take for instance the weather reports by Professors Snow and Lovewell, which have been furnished to the public; the botany of the State by Prof. Carruth; the geological formations by the late Prof. Mudge; besides mineral deposits, insect life, etc., by other members of the academy.

We know little in regard to our mineral wealth. The digging of a well has developed coal, opened up lead mines, brought forth mineral waters, unearthed hidden treasures, etc. If the State should take hold of a geographical survey and prosecute it faithfully the public would find that Kansas possesses within her valuable resources, which now lie idle and unknown. What is there in a geological survey that the farmer, merchant and mechanic should lend his aid and influence in securing an appropriation for this purpose? He might say if coal was found in great abundance in his vicinity, it would reduce the price; if the rainfall could be regulated so they could get it when needed; if frost could come only in winter; if grasshoppers could be kept away; if all the various insects that prove so destructive to fruit and grain could be rendered harmless, a geological survey would be a good thing. We all agree to this, and believe a great deal may be accomplished in benefitting the public that they do not know of now, and much more to the development of the State.

A bill was introduced during the meeting of the last legislature asking for a small appropriation for a geological survey. A large number of the members thought it a good thing, but that the railroad bill should pass first. Others said it will cost too much, can't afford it; others asked what is the use of a geological survey? Another said a geological survey is to pay the expenses of collecting old bones and minerals that are found scattered over the prairies. These are some of the objections to a geological survey, showing that the purpose and object are not generally known. Some think it is merely topographical survey, that refers to the surface entirely and has little or nothing to do wtth anything found below the surface. From the various opinions that people have in regard to it, we believe a great many do not understand what a geological survey is, or the benefits to be derived from it. If properly understood we believe there would be no difficulty in securing an appropriation for the work.

We shall endeavor briefly to state what a geological survey is, and some of the advantages of it. It comprises exploring everything on and below the surface, where the most valuable part of the earth may be found, boring and digging into the crust of the earth to any depth that may be necessary to develop everything that

may be of value. Should coal be found, all information in regard to the area, depth, thickness of vein, character and value for heating purposes and probable cost of mining the same would be fully noted.

Location of lead and other minerals, the districts in which they may be found, their depth aud all other information that may prove of value.

Clays of various kinds for the manufacturing of pottery, tiling, brick, etc.

Chalk, limestone, sandstone, gypsum and other materials used for building purposes. Zinc, bismuth, arsenic, strontia and other minerals used in the arts; the cost of mining the same, and their commercial value. Also the botany of the State, showing the distribution of the timber and vegetable growth indigenous to the State, water power on all the rivers and streams and the fall from various points, with such information as will enable every one to understand their availability as water-power for manufacturing purposes. An analysis of all the mineral waters, gas wells, their extent and value, and the practicability of using the gas for fuel and lighting purposes. An examination of the character of the soil from all the counties of the State with an analysis of the same, indicating the soil suitable for the growth of various agricultural productions, in such a way as to be of practical value to the farmer. Rainfall and temperature should be accurately obtained. Considerable attention would be given to the eradication, and means of destruction of insects that are injurious to fruit and fruit trees and prey on the products of the soil: these and a great many other things will be developed that will prove a benefit to our people and of immense value to the State.

County maps should be made, giving a full history of the resources of the county, describing accurately the depth, location, character of all coal deposits, clays, building stone, soils, water-power and all information that would be of value to the counties, and cost of utilizing the same. Publishing maps for the counties, supplying the people with the reports of the survey and disseminating information during the progress of the work. All these come within the range of a geological survey and properly belong to it. To do this work an expenditure of money, not a great deal less than $100,000 during the next ten years will be required to cover the entire expenses of it. In return for this outlay we cannot estimate in dollars and cents the value to the State. We have the evidence of the most prosperous States where surveys have been made, that it has been of untold value to them. It is a work of great importance, benefitting all the citizens alike, bringing prosperity, building up and developing the State and publishing the advantages that we possess now hidden from view; saving thousands of dollars to people who, without any knowledge of what we have, embark in enterprises that may or may not be a success. The useless waste of money would be prevented. With a geological survey, almost a certainty in regard to success would be secured.

If you want to mine for coal, you will know at what depth and in what quality it can be fonnd. If for lead, zinc and other metals, reference to the geological

survey will tell you; all question concerning the existence of mineral waters, building materials, etc., will be fully answered.

At the present time there is considerable interest manifested in regard to the sinking of artesian wells in the western part of the State, which cannot be done until a geological survey has been made, and to delay now would be hindering the growth and development of our State. We believe it would be for our best interests. In order to get the experience of other States that have had geological surveys, I some time ago mailed to the Secretaries of each one of the States in the Union a number of questions in regard to the matter, and have received replies from twenty eight States.

The doctor then read the replies received from these States in regular order, beginning with Maine in the East, and closing with Colorado in the West. All bore testimony to the great importance and value of such work wherever it had been done.

Third day's session opened with the reading of the "Reports of the Commission on Chemistry upon the Year's Progress," as follows:

"In Organic and Physiological Chemistry," Prof. E. H. S. Bailey, Lawrence.

On "Technical and Industrial Chemisty," Prof. H. E. Sadler, Emporia.

On "Agricultural and Analytical Chemistry," J. T. Willard, Manhattan.

"Statistics of Color-Blindness in the University," Prof. E. L. Nichols, Lawrence.

On the "Analysis of the Water of the Fort Scott Artesian Well," E. H. S. Bailey and E. W. Walter.

"Some Special Tests in Regard to the Delicacy of the Sense of Smell," E. H. S. Bailey and L. M. Powell.

The afternoon session convened at 2 o'clock, and papers were presented in the following order:

On "Some minerals of Kansas," E. H. S. Bailey.

On the "Supersaturation of Vapors," Prof. E. L. Nichols.

On a "New Method of Studying Absorption Spectra," W. S. Franklin.

"November Meteors," R. S. Short.

The following valuable paper was then read by its author:

## "IS THE RAINFALL OF KANSAS INCREASING?"

PROF. F. H. SNOW.

In the present paper attention is called to the fact of an increase of rainfall rather than to the various theories which have been advanced to explain such increase, or to show that there ought to be an increase.

Geologists, physicists and astronomers are harmonious in accepting it as an established fact that the earth in common with all other worlds in the universe is

slowly passing through a series of changes from an original nebular mass of intensely high temperature to an entirely solid mass of low temperature. The sun and the larger planets of our system illustrate the early stages in this series of changes. The earth is in an intermediate condition between the two extremes, and the earth's moon represents the extreme of entire solidity, in which the waters and the atmosphere which once covered and surrounded its surface have been absorbed within its mass, and a very low temperature continually and everywhere prevails. There can be no doubt that the earth is very gradually approaching the moon's condition, and that some time in the far distant future, how many millions of years hence no man can determine, its atmosphere and surface waters will entirely disappear, and a low temperature prevail, even in its tropical regions far exceeding the cold of the coldest Arctic winters in the present age. There can be no doubt, therefore, that, considered with reference to long periods of time, the rainfall of the earth is diminishing. If prehistoric man, 10,000 years ago, had kept scientific records of the rainfall of his time, and it were possible to compare these records with those of the present day, it would be found that a considerble reduction of the average annual precipitation has been made in the period named. Even a thousand years might show a perceptible decrease. But in so short a period as the lifetime of a single generation of men, or even in an entire century, the average annual rainfall of the entire globe has probably been reduced to so slight an extent as to be expressed by a very few hundredths of an inch.

Yet, although the entire movement is in the direction of a reduction of the rainfall, there are without doubt, local oscillations in consequence of man's influence upon nature, which in some cases result in a more rapid decrease than would otherwise be accomplished by the unaided forces of nature, and in other cases within limited areas secure an actual increase in the rainfall. I believe the State of Kansas furnishes an apt illustration of a change of the latter sort. Here the circumstances have been extremely favorable to such a change. Thirty years ago the Territory of Kansas was not occupied by the white man, and if we except a few acres cultivated by the Delaware Indians, no portion of her soil had been turned up by the plough. Her entire area was included within the vast and almost unknown region of the "Treeless Plains" and the "Great American Desert." During that brief intervening period, more than 1,000,000 people, chiefly of the agricultural class, have taken possession of her domain and have already brought her to the very front rank of the States of the Union in the extent and value of her agricultural products.

History affords no other instances of the permanent occupation of so extensive an area previously unoccupied by man by so large an agricultural population in so short a space of time. Here certainly, if human agency could anywhere affect climate, would such an effect be produced. Here, assuredly, if settlement ever increases rainfall, will such increase be most marked and most unmistakable. That such increase has actually taken place, I believe to be established beyound a doubt. It is a circumstance peculiarly favorable to the determi-

nation of the point in question, that although the general settlement of Kansas by cultivators of the soil is of such recent date, reliable observations upon the rainfall had been made at the military posts upon her eastern borders for a sufficient period to make possible a satisfactory comparison between the rainfall before settlement and after settlement. The records at Fort Leavenworth cover the longest period and enable us to compare the nineteen years immediately preceding the occupation of Kansas by white settlers, with the nineteen years immediately following such occupation. During the first period the average rainfall was 30.96 inches; during the second period it was 36.21 inches, giving an average increase of 5.21 inches per annum. Here we have an increase of nearly 25 per cent in the rainfall, under such conditions as to necessitate the inference that such increase is chiefly, if not entirely, produced by causes connected with the introduction upon a large scale of an agricultural population into a previously uncultivated territory. The Fort Leavenworth records cover so long a period of time (nearly forty years), that the increased average of the second half of the period cannot be attributed to a mere "accidental variation." In the issue of *Science* for April 18, 1884, it is stated that "the supposed increased rainfall in the dry region beyond the Mississippi is not borne out by the returns of the Signal Service." But the records of the Signal Service, upon which this statement was based, include a period of only twelve years of observation, from 1871 to 1882, which is undoubtedly too short a period for either establishing or disproving the fact of a "secular" variation. We have also called attention to the fact that causes which have a tendency to secure an increased rainfall, have here been put into operation upon a grander scale than in any other portion of the dry region west of the Mississippi.

But the fact of an increased Kansas rainfall does not rest entirely upon the Fort Leavenworth observations. There are other stations in Kansas whose records cover a much longer period than that of the longest established regular station of the Signal Service. There are the twenty years' records of the United States military post at Ft. Riley, the twenty-four years' records of the State Agricultural College at Manhattan and the seventeen years' records of the State University at Lawrence. If these several periods of observation be divided into two equal parts, in each case it is found that the average rainfall of the second half is notably greater than that of the first half. At Ft. Riley the increase amounts to 3.05 inches per anuum, and at Manhattan to 5.61 inches per annum and at Lawrence at 3.06 inches. Expressed in per cent the rainfall of these three stations has increased in the second half of each period of observation at Ft. Riley, 13 per cent; at Manhattan, 20 per cent, and at Lawrence over 9 per cent. If increased rainfall could be shown by the records of a single station only, or if the several stations, with sufficiently long periods of observation, exhibited discordant results, some indicating a decrease, while others indicated an increase; or, if even a single station indicated a diminished rainfall, the fact of a general increase would lack satisfactory demonstration. But the entire agreement of the four stations, whose records have value in a discussion of this question, seems to es-

tablish beyond doubt the fact of an increased rainfall in the eastern half of Kansas.

There can be no reasonable doubt that the general settlement of the western portion of Kansas will have a similar effect upon its rainfall, but it is not reasonable to expect that Western Kansas will ever boast of a rainfall equal to that of Eastern Kansas. So long as the eastern half of the State remains to the east of the meridian forming the western boundary of the Gulf of Mexico, the south winds will cause it to receive much larger supplies of vapor for condensation into rain than will be received by the western half of the State, which lies beyond the immediate track of the vapor laden winds. It must be remembered that climatic changes are exceedingly gradual and a rain deficiency or excess for a single year, or for two or three years in succession, must not be considered as invalidating the law of general averages. Neither should the fact that the rainfall upon the whole is increasing induce settlers to break land in the western third of Kansas with the expectation of successfully raising the same crops as in Eastern Kansas. Such settlers will surely be disappointed. It is even doubtful if paying crops of any kind can ever be continuousiy produced in that region. With an average before settlement of about 15 inches per annum, the same percentage of increase as has been made in thirty years would reach an amount of less than 18 inches per annum,—a quantity entirely inadequate to maintain successful agriculture.

Following this paper by Prof. Snow, the papers as given below were read and discussed until a late hour in the afternoon:

"Notes on the Geology of the Spanish Peaks," Joseph Savage, Lawrence.

"Practical Studies in Geology, C. H. Sternberg, Lawrence.

"Sources of the Kansas River Sands," Joseph Savage.

"The Last Submergence and Emergence of Southeastern Kansas from the Carboniferous Seas," E. P. West, Wyandotte.

"Notes on the Geology of Douglas County, Kansas," Joseph Savage.

"The Christening of Amethyst Mountain in Yellowstone Park," Joseph Savage.

"In the Dakota," Robert Hay, Junction City.

Report of the Commission on Mineralogy on the catalogue of Kansas Minerals, Prof. G. H. Failyer, Chairman, Manhattan.

"Notes on a Bison from the Tertiary," Robert Hay.

The following papers were read at the regular sessions.

"Additions for 1884 to the Catalogue of Kansas Coleoptera," Warren Knaus, Salina.

"On the Preparatory Stages of *Hyperchiria Zephyria* Grote," Prof. F. H. Snow, Lawrence.

"Contributions to a Catalogue of Kansas Hemiptera," Prof. E. A. Popenoe, Manhattan.

"On Some Salt Marsh Coleoptera," Warren Knaus.

"On Some Rare Coleoptera from Southern New Mexico," Prof. F. H. Snow.

"List of Kansas Orthoptera collected in 1884," Prof. E. A. Popenoe.

"Report of the Commission on Ichthyology," Prof. I. D. Graham, Chairman, Manhattan.

"Some Kansas Food Fishes," Prof. I. D. Graham.

Additional papers were promised by Prof. D. L. Jordan and others.

"Contributions to a list of Kansas Mollusca," Prof. E. A. Popenoe.

"The Historical Indian," Frank Kizer, Emporia.

"Partial List of Parasitic Fungi of Kansas," Prof. W. A. Kellerman, Manhattan.

"How to Botanize," E. N. Plank, Independence.

"On Generic Characters in Botany, B. B. Smyth, Topeka.

"Vegetation in Western Kansas," Rev. J. D. Parker, U. S. A., Ft. Hays.

"On a Method of Arranging a Herbarium for Popular Inspection," Rev. J. H. Carruth, Lawrence.

"Note on the Coloration of Fluorite at Different Temperatures," Prof. G. H. Failyer, Manhattan.

"Some Kansas Mineral Waters," Prof. G. H. Failyer.

"Fossilized Buffalo Jaws," Prof. Robert Hay, Junction City.

"Effects of Parasitic Fungi upon the amount of Sugar in Stalk and effects of Silo Treatment upon the amount of Sugar in Sorghum," E. B. Cowgill, Sterling

"Notes Upon Gulls, A. P. Fellows, Lawrence.

"November Meteors," Mr. Short, Lawrence.

The officers for the coming year are as follows: President—Dr. R. J. Brown, of Leavenworth; Vice-Presidents—Prof. E. L. Nichols, of Lawrence, and Prof. G. H. Failyer, of Manhattan; Treasurer—A. H. Thompson, of Topeka; Secretary—Prof. E. A. Popenoe, of Manhattan; Curators—O. H. St. John J. T. Lovewell, G. S. Chase, J. H. Carruth, and F. W. Cragin; Librarian—F. W. Cragin.

On Tuesday evening a popular lecture was delivered by Prof. J. D. Parker, U. S. A., upon "Circular Storms," which was very well received by a fair audience.

The discussions that followed the reading of many of these reports and papers were not the least interesting part of the proceedings, and testified at the same time to their value.

The hospitality of the Lawrence members was unbounded, and many of the students of the University and residents in the city participated in the sessions and lectures.

Manhattan was selected as the place for the next annual meeting.

All friends of science will be glad to learn that the Kansas Academy is steadily growing in influence and usefulness, and is likely to become an important factor in the future development of this great State.

# MEDICINE AND HYGIENE.

## COCAINE AS A LOCAL ANÆSTHETIC.

FLAVEL B. TIFFANY, M. D.

Cocaine, a local anæsthetic which is now engaging the attention of the medical profession throughout Europe and America, is an alkaloid of the *erythroxylon coca*. For nearly thirty years the natives of Peru, the country in which the shrub is indigenous, have used the leaves of the plant when making long journeys, as an exhilarant and a promoter of a greater power of endurance and of respiration. Scientific knowledge of the power of this drug dates only one year back. The Germans first employed it in the examination and treatment of the throat. To Dr. Kohler, a student of Vienna, belongs the honor of discovering this boon in ophthalmic surgery. He communicated this discovery to Dr. Brettaner, of Trieste, who demonstrated its magic power before the last ophthalmological congress of Heidelberg.

It was first introduced into the United States, October 11, 1884, by our distinguished confrere H. D. Noyes, who witnessed the experiments at Heidelberg. Since that time, a little more than two months, all the prominent members of the medical profession here have been on the *qui vive* to test the power of this drug to the utmost. Drs. Agnew, Knapp, and others, have reported of several cases of major and minor operations upon the eye, in which its efficacy as a local anæsthetic was thoroughly proven. Dr. Wm. Olive Moore and more recently many others, have used it with good results in inflammations and ulcerations of the cornea and conjunctiva (front part of the eye-ball). Last Tuesday, November 18th, I used a two per cent solution of the hydro-chloride of cocaine upon a man sixty-seven years of age, for the extraction of a cataract. I made a preliminary application in the morning that I might observe its action. In about three minutes after an instillation of three drops there was complete anæsthesia of the anterior portion of the eye-ball, so that I was able to pass my finger-nail over the front of the eye without the least discomfort to the patient. The anæsthesia passed off in about thirty minutes, leaving no irritation of the eye. In the afternoon of the same day, at the Sisters' Hospital, I used the same per cent solution, increasing the number of drops, and in about three minutes the eye was completely benumbed.

The patient, passing his finger over his eye, said that there was no feeling there: "Doctor you could gouge my eye out now, if you wanted to, and I should not feel it." I then made the operation without the least discomfort to the patient and the results of the operation have been perfect. On Monday the 24th, I again employed it in the same operation on a man aged seventy-nine years

with equally happy results. In both cases there was entire absence of pain in the eye, or swelling or inflammation of the lids, complications not unfrequently arising from nausea and emesis produced by ether or chloroform. On the day following the first operation, November 18th, wishing to test the drug as to its efficacy as a general anæsthetic as well as a local, Dr. E. Von Quast, of this city, experimented with me upon a Guinea-pig with the following results. At 11 A. M. we injected hypodermically one-half minim of a two per cent solution: in three minutes there was a slight dilatation of the pupils, accompanied by a general muscular exhilaration; five minutes later we injected another half minim with no increased effect, then we used three minims with some diminution of sensibiliity. In twenty minutes from the first injection I injected five minims more, which occasioned complete loss of sensibility.

We could now now pass the hypodermic needle through the foot, ears, tongue, or fold of the skin without eliciting the slightest sign of pain or discomfort, whereas before the last injection the pig would squeal piteously whenever the needle entered his skin.

During the entire experiment there was apparently no loss of consciousness, nor of power of co-ordination, and up to now the pig is none the worse for the experiment. We may at least gather from this that cocaine may be a boon to animals in vivisection.

November 20th I used the solution hypodermically upon myself, some patients and several physicians, with the following general results: With from five to ten minims of a two per cent solution, injected in the forearm, there was almost immediately produced a sensation as of ants running over the skin, a slight numbness of the arm, and complete anæsthesia within a space of one inch from the point of injection. There was some slight exhilaration, a freer respiration, and slightly flushed cheeks. I have, within the last few days employed this agent in subduing photophobia (dread of light) and find it, so far, beneficial. I employed it also in a case of ezcema of the external ear, where there was intolerable itching, with good effect.

It acts like magic in subduring the pain of acute inflammation of the middle ear. It is also useful in reducing the sensibility of the lining membrane of the nose, when necessary to treat the ear through this channel.

Cocaine has also been employed in the treatment of hæmorrhoids, in removing polypi of the nose and ear, small tumors of the skin and in the treatment of diseased mucous surfaces in general with happy results.

KANSAS CITY, December 1, 1884.

# BOOK NOTICES.

ANNUAL REPORT OF THE SMITHSONIAN INSTITUTION FOR 1882, Spencer F. Baird, Secretary. 8vo., pp. 855. Government Printing Office, 1884.

This report, though, as usual with all government documents, nearly two years behindhand in being published, is really an exceedingly valuable work. It comprises the Proceedings of the Board of Regents for the January meeting, 1883, Report of the Executive Committee, the Annual Report of the Secretary, and the General Appendix; which last presents a record of recent progress in the principal departments of science and special memoirs, original and selected, of interest to collaborators and correspondents of lhe institution, teachers and others engaged in the promotion of knowledge. The various departments of science have been ably presented by Prof. Baird himself, Prof. E. S. Holden, Prof. T. Sterry Hunt, Lieut. F. M. Green, Prof. Cleveland Abbe, Prof. Geo. F. Barker, Prof. H. Carrington Bolton, Prof. E. S. Dana, Prof. W. G. Farlow, Prof. Theodore Gill and Prof. O. T. Mason. All of these gentlemen are experts in their several lines of study, and the reader need look no further for a complete statement of the progress made in each department during the year 1882.

If these reports could be published with reasonable promptness they would be of the greatest value to students and others; as it is, they are usually laid upon library shelves as mere works of reference.

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PUBLICATIONS OF THE WASHBURN OBSERVATORY OF THE UNIVERSITY OF WISCONSIN, Volume II, Octavo, pp. 400. Democrat Printing Co., Madison, Wisconsin, 1884.

This observatory, founded by the late Hon. C. C. Washburn, is under the directorship of Prof. E. S. Holden, of the U. S. Naval Observatory. Its equipment of instruments is very complete and has been largely increased since the publication of the first volume, notably by the purchase of a Repsold Meridian Circle at a cost of over four thousand dollars, to a description of which some fifty pages are devoted. Also by the purchase of a Sidereal clock, a Howard mean time clock, a six-inch equatorial telescope, and a number of minor instruments. Besides these, the library has received quite an accession, and now consists of about 1,000 volumes and 600 pamphlets.

The work of the Observatory has been extensive and various, both astronomical and meteorological, the latter department having been added in August 1883, when the instruments, etc., of the signal service station at Madison were transferred to it. Few observatories in the country are superior to the Washburn either in the number and value of its astronomical instruments or the amount and quality of the work done.

FIRST PRINCIPLES OF NATURAL PHILOSOPHY: By Elroy M. Avery, Ph. D. 12mo., pp. 402. Sheldon & Co., New York and Chicago, 1884. For sale by M. H. Dickinson, $1.00.

Doctor Avery's Physical Science books have a well deserved reputation for simplicity, clearness and thoroughness wherever they have been used. This little work, the first of the series, is intended for the use of schools in which the course is not full enough to warrant the use of the Author's "Elements of Natural Philosophy," a larger and more comprehensive treatise. The arrangement of topics, the method of their handling and the illustrations are all excellent, and in addition to this the latest developments of science, such as the introduction and use of electrical units, have been freely utilized. The work is divided into nine chapters in which are discussed respectively, matter, motion and force, simple machines, liquids, pneumatics, electricity and magnetism, sound, heat, light. The concluding chapter takes up the subject of energy. The index is copious and carefully arranged.

The younger students will find this an excellent text book and the recapitulatory exercises especially valuable.

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THE HOME PHYSICIAN: By Luther M. Gilbert, M. D. 12mo. pp. 131. G P. Putnams' Sons, New York, 1884. For sale by M. H. Dickinson, $1.00

This little work is intended for the use of travellers and families at a distance from physicians, and contains much valuable advice and instruction for such persons. It is divided into an introduction in which, among other things, a list of household medicines is given, a chapter on the Uses of medicine, one upon general Observations of Symptoms and Remedies, a third giving descriptions of Disease and Treatment, a fourth upon Surgery, and a final one upon Poisons.

Doctor Gilbert is attending physician at the Connecticut General Hospital at New Haven, and also President of the Medical Board of the same. His experience has been large and his suggestions are based upon an extensive practice. If any fault is to be found with his advice as to treatment, it is that in some of the most serious and fatal diseases, such as croup, and diphtheria, sufficient stress is not given to prompt and vigorous measures. In other respects the advice given is good and rational. For the purposes for which it was written it will be found very useful.

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BULLETIN OF THE MUSEUM OF THE STATE UNIVERSITY OF MISSOURI. NIAGARA FOSSILS: By J. W. Spencer, B. A. Sc., etc; Professor of Geology in the University of the State of Missouri. Vol. 1. No. 1. Printed for the Museum, May, 1884.

This bulletin is the first of a series proposed to be issued by the officers of the Museum of the State of Missouri, giving the result of scientific investigation from time to time in this form. This paper includes (Part I) a Monograph of

forty-one species of *Graptolitidæ* (of which thirty are new); (Part II) a Monograph of *Stromatoporidæ*; and (Part III) a description of fifteen other new species of Niagara fossils. The *Graptolites* are plant-like animal forms of much interest to palæontologists on account of their great antiquity and their having long occupied the border land between plants and animals, but the idea of their plant-origin has been abandoned and they are now placed with the Polyps. The forty-one species of fossil Graptolites described in this paper are principally from the Upper Silurian at Hamilton, Ontario. In the introduction the student will find much valuable information in a condensed form in regard to the literature of the history of the study of the Graptolite family, their geological distribution, zoölogical affinity, structure, etc.

After the Graptolites the most interesting fossils of the Niagara formation are the Stromatoporidæ. In Part II. a number of species of this family are described, four of them being new; preceded by a short account of the genus Stromatopora. In Part III, fifteen other new and interesting fossils from the same formation at Hamilton, Ont., are described. Nine plates of about eighty-five good figures, add much to the value of the Bulletin, and will assist the student in identifying the fossils described.

It is to be hoped the officers of the Museum will soon work up the accumulations of the various Geological Surveys of the State of Missouri, which have long remained buried in the University and are now at their disposal. The results of their investigations in this mass of material, given in the form of this Bulletin, will be of great interest and value to scientists, and especially the geologists of this state. L.

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PUBLIC RELIEF AND PRIVATE CHARITY: By Josephine Shaw Lowell. 12mo. pp. 111. G. P. Putnams' Sons, N. Y. 1884. For sale by M. H. Dickinson. Paper 40c., cloth $1.25.

This is Number XIII of Putnam's "Questions of the Day" series, which so much attentton by reason of their practical discussions of every day political and social topics. Its author has been and now is identified with the public charities of New York, and, as this work shows, is abundantly capable of discussing the subject. The first chapter gives her personal views on the subject of Public Out-door Relief, the second is a compilation of the various Practices in this direction in England, the third the Practices in Europe and the United States. To these follow the author's conclusions. The second part is devoted to Private Charity, and in it are discussed charitable institutions, principles and rules, methods in city and county, with practical suggestions based upon the author's experience. It is a work of great worth, and we recommend it to the Provident Associations and other public charity societies in the West as a practical guide, or at least, a competent helper in their perplexing and burdensome labors.

A YOUNG GIRL'S WOOING: By E. P. Roe. 12mo. pp. 482. Dodd, Meade & Co., N. Y., 1884. For sale by M. H. Dickinson, $1.50.

We do not know how many novels Rev. Mr. Roe has written, but, judging from the large sales of all of them, he has not yet "outlived his usefulness" nor his popularity. Whatever we may say of such books in general, it is proper to say that the style of the author is attractive and the moral tone of his works irreproachable.

The volume under consideration is no exception in excellence to those preceding it, and is interesting as a story and well written as a literary production.

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THE RELIGIONS OF THE ANCIENT WORLD: By Professor George Rawlinson. Sent to any address for 30 cents. J. Fitzgerald, Publisher, 20 Lafayette Place, New York. For sale by M. H. Dickinson.

The study of the religious systems of antiquity, of the forms assumed by religious ideas in their development among the Egyptians, Babylonians, Chaldeans, Greeks, Romans, and other ancient peoples; their mythologies, their curirites and ceremonies, their beliefs as to a future state, etc., is one of the most important and interesting branches of historical research. No more competent guide in this fascinating study could be found than Mr. Rawlinson, the well-known author and Camden Professor of Ancient History in the University of Oxford, and no edition can better meet the wants of the masses than this.

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## OTHER PUBLICATIONS RECEIVED.

Bulletin of Museum of State University of Missouri: Niagara Fossils, by J. W. Spencer, B. A. Sc. in 3 parts, Vol. 1, No. 1., St. Louis, Mo., 1884. Papers of Archæological Institute of America, II: Report of Archœlogical Tour in Mexico, in 1881, by A. F. Bandelier; published by Cupples, Upham & Co., Boston, Mass. Instructions to Custodians of Public Institutions under Treasury Department, Government Printing Office. Catalogue of Flora of Minnesota, including its Phœnogamous and Vascular Cryptogamous Plants, by Warren Upham, Part IV of Annual Report of Progress of 1883, Minneapolis, Minn. Johns Hopkins University Studies—Herbert Adams, Editor. Second Series XI, Rudimentary Society Among Boys, John Johnson, Jr., Baltimore, Md. Report of Kansas State Board of Agriculture, for month ending Sept. 30, 1884, containing Topographical Description of State, Population, etc., Wm. Simms, Sec'y, Topeka, Kansas. The Health Miscellany, Fowler & Wells, Publishers, New York, 25cts. Address of Commander in Chief, Presented at National Encampment of G. A. R., Minneapolis, July, 1884, Philadelphia, Penn. Department of Agriculture—Chemical Division No. 3. The Northern Sugar Industry, during 1883, by H. W. Wiley, Government Printing Office. Department of Agriculture, No. 4, an Investigation of Composition of American Wheat and Corn, by Clifford Richard-

son, Government Printing Office. Popular Fallacies regarding Precious Metal Ore Deposits, by Albert Williams, Jr. Questions of the Day, XVI: The True Issue, by E. J. Donnell, G. P. Putnams' Sons, N. Y. 1884. Emblematic Mounds, reprinted from American Antiquarian, by Stephen D. Peet. Choice Literature Monthly Vol. 4, No. 21, $1.00 a year, John B. Alden, Publisher, N. Y. The Book Record, October, 1884, Vol. 1, No. 4, J. B. Alden, Publisher, N. Y., 25 cents a year.

The Monthly Weather Service, September, 1884, under direction of Gen'l W. B. Hazen, Thomas W. Woodruff, Editor, Signal Office, Washington, D. C. 1884. *Blackwood's Edinburg Magazine*, No. DCCCXXXVIII, Philadelphia, October, 1884, Leonard Scott Publishing Co., $3.00 a year, each No. 30 cents.

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# SCIENTIFIC MISCELLANY.

## RECENTLY PATENTED IMPROVEMENTS.

J. C. HIGDON, M. E., KANSAS CITY, MO.

PREVENTING THE AERATION OF LIQUIDS.—This invention relates to an apparatus for preventing the aeration of liquids in the process of withdrawing them from kegs or barrels, and it consists of a metallic tube formed with joints at suitable points and having at one end a tapering bung-piece within which a correspondingly tapered plug fixed upon a smaller induction tube, is removably secured.

The induction-tube has fixed to one end an expansible rubber bag or similar instrument. Much inconvenience and loss has heretofore attended the operation of drawing fermented liquids, for upon a quantity of the liquid being withdrawn from the cask the atmosphere enters and contaminates the whole.

In operation the induction-tube being attached to the tapered plug and to the inflatible vessel, the tubular bung-piece which is secured to the main tube is affixed to a barrel or cask of liquid, then the rubber bag is folded into a sufficiently small package, and by means of the inflexible induction-tube, it is inserted into the top of the main tube and forced therefrom to the interior of the cask, where it is inflated correspondingly as the said liquid is withdrawn.

Meanwhile the tapered plug has been forced to a tight joint within the tapering bung-piece. By attaching a funnel to the upper end of the induction-tube or by a similar arrangement, ice water may be used as the inflating fluid.

After all of the liquid has been withdrawn from a barrel or keg and it is not desired to apply the apparatus immediately to another, the main tube, together with the attached bung-piece and the induction-tube therein contained are first sufficiently loosened in the bung and then carefully withdrawn until the flexible

vessel (which obviously becomes disinflated by the operation) is clear of the bung-hole, after which it is then, by means of the induction-tube, drawn within the main tube, where, as before mentioned, it will be secure from the ravages of insects and vermin.

The inventor is Mr. J. H. Partridge, of Kansas City.

STOP-VALVE FOR RADIATORS, ETC.—This improvement consists in providing the valve-casing with a removable packing-seat in addition to the main valve-seat and further, with a continuous spindle that is devoid of a screw, and in lieu thereof is provided with a spiral-sping and a locking-lug which operates within a suitable longitudinal opening through the spindle casing.

The object being to construct a stop-valve principally for use upon steam-radiators, that will be quick in action, easy of operation and of simple construction and repair.

A suitable operating handle is attached to a plain valve stem operating within the stem-casing, which latter is provided with a longitudinal slot within which the locking-lug is adapted to operate and, by reason of an annular cam-shaped extension thereof in which the said lug adapted to be slightly rotated, the valve may be securely locked in a closed position.

The connections are threaded in the usual manner, and when it is desired to open the valve, the stem is slightly rotated, thereby releasing the locking-lug and bringing into action the spiral spring which instantly throws the valve open until its packing-side comes into contact with the seat upon the upper end of the thimble.

The thimble is provided with an annular flange, and is threaded upon each side for the purpose of forming a joint between the base of the spindle-casing and the valve casing.

A number of inclined notches are placed along the sides of the locking-slot, for the purpose of holding the valve at any intermediate point of opening.

The inventor of this improvement is Mr. C. E. McClellan, of Kansas City.

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## GRASSES OF THE GREAT PLAINS.

Dr. George Vasey, botanist of the department of Agriculture, has returned having spent a month in the arid region of the west, chiefly in northern New Mexico, Colorado, and western Kansas and Nebraska, where he has been engaged in collecting specimens of the indigenous grasses of the country for the New Orleans exhibition, and making observations on the distribution of the different varieties, especially those which constitute the staple of the great pastures of the plains. Of fifty varieties obtained, all but a dozen or so were found in elevated situations on the mountain sides, where there is more moisture than on the plains; but it is among the dozen varieties found on the lower levels that the great herds of the pastoral region find their food, and of these the two varieties

known as buffalo grass and gramma grass, are beyond comparison the most important. These two, with the "blue grass," which ranks next in order, though far below them, constitute from seventy to ninety per cent of the pasturage of the arid region. The "blue grass" just mentioned—which must not be confounded with the cultivated grass of the same name—is found chiefly in low and comparatively moist spots, where it sometimes grows quite rank, attaining a height of three feet and making a good hay or acceptable winter pasturage. Cattle, however, will not eat it while the more nutritious buffalo aad gramma grass are to be had. Of these latter, Dr. Vasey found that the gramma grass (which in the northern territories is sometimes erroneously included under the term buffalo grass) predominates near the margins of the little streams and for some distance away from them, while the buffalo grass is the more abundant along the ridges. In the smaller mountain valleys gramma, as a rule, predominates.

Dr. Vasey estimates the number of cattle that can be pastured on a square mile within the arid region at from thirty to fifty head. He thinks that the produce of some of the wild grasses might possibly be increased by cultivation, and thinks it desirable that experiments should be made in that direction, and in general with a view to ascertaining the capabilities of the arid lands.

Alluding to the prevailing western opinion that the amount of rainfall increases with the settlement of the country and the breaking of the soil by the plows, he said that within the past three years there had undoubtedly been a considerable and successful advance of cultivation over lands formerly regarded as arid, but whether the rainfalls would permanently prove sufficient for agriculture remained to be seen. He noticed, however, that many ten acre tracts of timber planted within the limits of the arid region under the timber culture act, appeared to be doing well, though in some cases he saw tracts where the trees, either from neglect, lack of moisture, or other cause, were dying out.

The boundary between the arid region and the country where the rainfall is sufficient for agriculture has commonly been placed at the 100th meridian. Dr. Vasey appeared to think that it might possibly be placed as far west as the 105th meridian, though the line is an irregular one, being further west in northern than in southern latitudes, and considerably further in the valleys near the longer rivers than in the more elevated regions lying between these streams.—*National Republican.*

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## THE STATE OF IOWA ONE HUNDRED AND SIXTY YEARS AGO.

The State of Iowa was delineated upon an old globe one hundred and sixty years ago. This globe is over seven feet in diameter and was made of wood, by a Capuchin monk, Father Legrand, in 1720, and is to-day preserved in the public library of Dijou, the French ancestral home of Father Laurent. On the proper place on its huge surface is marked the then known geography of what is now the State of Iowa and adjacent territory, and as elsewhere appears in the report

of the Academy of Science meeting, transcripts of this part of the globe (relating to Iowa) have been carefully made by M. Guignard, librarian of Dijou, and transmitted to the Academy.

What was known of Iowa and what was Iowa 160 years ago? We find the great river flowing by her eastern border and then known as the "Missisipi." Lake "Pepin" is located near St. Paul and is an immense widening of the river, which from this point north breaks into many streams.

The River des Moingona is easily recognizable from its name and course as the Des Moines, and is quite accurately traced, but widens into an immense lake near the Minnesota line, and at a point quite above is marked the spot inscribed, "To this point came the Baron Lahontan." It is probable that the Baron got mixed up in traveling over those marshy prairies, for though he evidently struck Lake Obokoji and Spirit Lake, he evidently got over on the Missouri. This river is down, but it runs parallel with the Moingona or Des Moines, up into Iowa and comes to a sudden end. Between these rivers was the apparent missionary ground of the Jesuit Fathers, for this country is thickly lined with the names of Indian tribes, while north of the Des Moines we find few Indian settlements.

Of the Indians, the Panis appear the most numerous. Others are the Esanapes, Panibousas, Paoutaouas, Aiaouez, Mahas, Tintons, Osages, Apanas, Panisassas, Cansas, and the Illinois, the latter being put on the west bank of the Mississippi, near St. Louis.

The only bluffs marked on the great river are located near Muscatine and below in Illinois.

There is a river flowing from a Lake Panis in Missouri eastwardly, which is named "Meschasepi," evidently a corruption of or the original of Mississippi.

The Ouabache (Wabash) empties into the Mississippi where the Ohio joins it, and the fathers evidently supposed the two rivers were one and the same.

Fort St. Louis is marked on the Illinois River, about 100 miles from its mouth.

Salt Springs are located very near the celebrated Hot Springs of Arkansas, and it is probable that the famous Arkansas baths had been tried by these early missionaries, let us hope with great relief to those pioneer fathers who were traversing the malarial swamps of the West 200 years ago in the service of their Master.

Many other singular features appear in these *extraits* from the old globe. They are the earliest map of Iowa extant, so far as known, and will be studied with deep interest by students of history and geography. They settle the question of the origin of the name of Iowa's capital and river, which but for the elegance of the present combination should be changed from Des Moines to Moingona. The present name has no meaning; the other name would perpetuate the memory of what appears to have been Iowa's most powerful tribe of Indians.—*Muscatine Journal.*

## THE LABORATORY THAT JACK BUILT,

### OR THE HOUSE THAT JACK BUILT ON CHEMICAL PRINCIPLES.

A little nonsense now and then
Is relished by the wisest men.

This is the laboratory that Jack built.

This is the window in the laboratory that Jack built.

This the glass that lighted the window in the laboratory that Jack built.

This is the sand used in making the glass that lighted the window in the laboratory that Jack built.

This is the soda that melted with sand compounded the glass that lighted the window in the laboratory that Jack built.

This is the salt, a molecule new, that furnished the soda that melted with with sand compounded the glass that lighted the window in the laboratory that Jack built.

This is the chlorine of yellowish hue, contained in the salt, a molecule new, that furnished the soda that melted with sand compounded the glass that lighted the window in the laboratory that Jack built.

This is the sodium, light and free, that united with chlorine of yellowish hue, to form common salt, a molecule new, that furnished the soda that melted with sand compounded the glass that lighted the window in the laboratory that Jack built.

This is the atom that weighs twenty-three, consisting of sodium so light and free, that united with chlorine of yellowish hue to form common salt, a molecule new, that furnished the soda that melted with sand compounded the glass that lighted the window in the laboratory that Jack built.

This is the science of chemistry that teaches of atoms weighing twenty-three, and of sodium metal so light and free, that united with chlorine of yellowish hue to form common salt, a molecule new, that furnished the soda that melted with sand compounded the glass that lighted the window in the laboratory that Jack built.—*The Age of Steel.*

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## SPOUTING OIL-WELLS IN RUSSIA.

The principal oil-wells of the Baku district lie at Balaxame or Balakhami, about six miles to the northeast of the town: this is an oil-field about three and a half miles in length by one and a half in breadth. To the south lies a smaller field called Bëbeabat. One fountain at Balakhani, ninety eight feet in depth, is noted as having been flowing steadily for upward of two years, and still continuing to yield 800 barrels a day. Another well not far off, 490 feet deep, commenced its career by throwing up a jet thirty feet in the air, and then flooding

the land with oil for a considerable distance all around, overflowing other wells and several small refineries, so as effectually to stop their work. The roar of the rushing oil and gas could be heard a mile from the spot.

Various flowing wells are said to yield 6,000 barrels a day, and some far more; but, from the fact that these quantities are generally stated in the Russian measure of poods, it is not very easy to realize what is meant. One pood, we learn, is equal to thirty-six pounds English. Hence one thousand poods represent somewhere about sixteen tons. Accounts have just reached England of an oil-fountain which was struck last December, and flows at the rate of from fifty to sixty thousand poods daily, gushing forth with such force as to break in pieces a three-inch cast iron plate which had been fastened over the well in order to divert the flow in a particular direction. In the same district a huge heap of sand marks the spot where an oil-spring, on being tapped, straightway threw up a column of petroleum to twice the height and size of the Great Geyser in Iceland, forming a huge black fountain two hundred feet in height—a fountain, however, due solely to the removal of the pressure on the confined gas, for there is no trace of volcanic heat. The fountain was visible for many miles round, and on the first day it poured forth about two million gallons, equal to fifty thousand barrels.

An enterprising photographer who was on the spot secured a photograph which places this matter beyond cavil. The fountain continued to play for five months, gradually decreasing week by week, till it finally ceased to play, leaving its unfortunate owners (an Armenian company) well-nigh ruined by the claims brought against them by neighbors whose lands were destroyed by the flood of oil.—*From "The Oil-Supply of the World," in Popular Science Monthly for December.*

## EDITORIAL NOTES.

THE present number of the REVIEW is an especially characteristic one, having no less than twelve original articles and communications, by Western writers, covering an unusual variety of subjects and equaling in ability and interest those of any other periodical of similar character in the country. Persons wishing to send off a periodical illustrative of the enterprise, education and talent of Kansas City and its environs should select this number.

WE omitted in our last issue to mention a very important scientific work that is being done at Washburn College, Topeka, Kansas, viz: "The Washburn Biological Survey of Kansas." It is in charge of Prof. F. W. Cragin, who is assisted by other members of the faculty and prominent scientists in various localities in the State. This work has been going on for about one year and the most interesting results have been attained, eliciting the encomiums of some of the best naturalists and biologists in the country. There results have been published in two Bulletins which will receive full mention in our next issue.

A SEVERE shock of earthquake was felt at Salt Lake City, Utah, on the morning of November 10th, at about 2 o'clock. Much alarm was felt but no harm was done. The tremors lasted about ten seconds. At Paris, Idaho, six shocks were felt about the same time, and from then till 4 o'clock. Con-

siderable damage to houses is reported, and people were affected as by seasickness. The first shocks were from north-east to south-west, then a swaying motion from north to south. The succeeding shocks were from east to west.

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THE Kansas Academy of Science, a portion of whose proceedings we give this month, had an unusually good meeting at Lawrence last week. This Association is doing excellent work for the State of Kansas, and its recommendations should receive the careful attention of her legislature.

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MR. C. A. NEWCOMB, of Colorado, is now in St. Louis superintending the publication of his work upon "The Mound-Builders" which will be ready about December 10th. We bespeak for it a favorable reception, as Mr. Newcomb is regarded as an authority upon this subject by his acquaintances.

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DR. D. G. BRINTON, Professor of Ethnology and Archæology, Philadelphia, Pa., offers to receive and answer without compensation, questions relating to American archæology, ethnology and linguistics. He also asks that persons having specimens of an anomalous or unusual character send him descriptions, drawings or casts of them; also that he may be apprised of any typical and well authenticated collections that can be obtained for scientific purposes, and of any promising localities for archæological researches, or of any local publications on these subjects and the names of persons interested in thom.

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WE are informed by a member of the Missouri River Commission that he tried in every way to secure early attention to the work needed near this place and urged its importance. The latter fact was self apparent to all. But each member of U. S. engineers said it was too late to begin work, that it could not be completed this fall and the winter ice would destroy it. With their experience the others had to agree in conclusion. An allotment of half the appropriation was made to be used at and near Kansas City, preparations to be made this fall and winter and work commenced as early as possible in the Spring.

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PROF. S. H. TROWBRIDGE, of Glasgow, Mo., has been working for some years upon a text-book to represent and explain the practical, objective method of teaching science, and has it now in manuscript ready for publication. As a test of the correctness of his views and methods he has incorporated a few of the representative parts of the work in a little pamphlet and sent it out for the inspection and judgment of scientists among teachers and practical workers, for the sake of receiving their suggestions and criticisms. This pamphlet can be obtained by addressing him by letter or card at Glasgow, Mo. From a hasty glance at it, for it was received just as this issue of the REVIEW was going to press, we are satisfied that the work, of which it is a forerunner, will be found instructive and valuable both in matter and method.

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THE National Board of Health has addressed a circular letter to the governor of each State in the union, calling attention to the prevalence of Asiatic cholera in Europe, its steady progress westward from India and Egypt during the past two years, and the danger of its reaching this country in 1885, unless prompt action is taken against its introduction through seaports. The circular advises that no point be left unguarded, for the present facilities for travel afford ample means for carrying the poison everywhere. The governors are urged to begin precautionary work at once, and to call the attention of the legislatures to the matter, and the organization of State Boards of Health is recommended.

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THE National Academy of Science held its usual fall meeting at Newport this year, commencing October 14 and continuing four days. The spring meeting must be held, in accordance with the constitution, in Washington, the third Tuesday of April in each

year. The autumn meeting is peripatetic, and has generally been held in New York or Philadelphia. The National Academy acts as an advisory scientific council to the government, and its members are required to perform such tasks as the government may give them without compensation. The number of members is limited to 100, and membership is considered a high honor not easily to be obtained. Among those present were: President O. C. Marsh, professor of palæontology of Yale; Home Secretary Asaph Hall, astronomer of the National observatory; Treasurer J. H. C. Coffin, United States navy; W. H. Brewer, professor of agriculture, Yale; G. J. Brush, professor of metallurgy, Yale; Josiah P. Cooke, professor of mineralogy, Harvard; Edward S. Dana, professor of physics at Yale; Walcott Gibbs, professor of chemistry at Harvard: Julius Hilgard, superintendent of the coast survey; Samuel P. Langley, astronomer in charge of the Allegheny observatory; A. S. Packard, professor of zoology at Brown University; Edward C. Pickering, director of the United States geological survey; Samuel H. Scudder, editor of *Science*, of Cambridge, Mass.; Wm. P. Trowbridge, professor of mechanics at Columbia College, and Francis A. Walker, president of Massachusetts Institute of technology.

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THE Cattle Grower's Convention held at St. Louis in the latter part of November recommended, among other things, that congress at an early day relieve the department of the Interior from the supervision and care of the bureau of public lands, and that it, as well as the care of all public lands and their belongings, be transferred to the department of agriculture; and that the Fish Commission, now in the charge and direction of the Smithsonian Institute, be also transferred to the care of the department of agriculture; and that the bureau of meteorology now in the charge of the War department, be also put under the direction and charge of the department of agriculture, and further that the department be then advanced to the full rank and dignity of other departments of our government, and further, that the secretaries of agriculture should be selected, not only for their capacity for organization and administration of public affairs, but also as a pre-requisite requirement that they be familiar with practical agricultural operations and interests, and such officers should, by preference, be selected from that section of country which is pre-eminently agricultural and not from a section the greater interests of which are centered in manufactures or commerce.

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FOR three years past there has been considerable excitement over alleged discoveries of gold in Northern Michigan. It now appears that gold has really been found in paying quantities in the upper peninsula, in the vicinity of Ishpeming, and that a number of companies have been formed for mining and reducing the ores, mills with the most modern machinery erected, etc. A rush of prospectors to these diggings is predicted for the next spring.

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## ITEMS FROM PERIODICALS.

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*Subscribers to the* REVIEW *can be furnished through this office with all the best magazines of this Country and Europe, at a discount of from* 15 *to* 20 *per cent off the retail price.*

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*To any person remitting to us the annual subscription price of any three of the prominent literary or scientific magazines of the United States, we will promptly furnish the same, and the* KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY, *besides, without additional cost, for one year.*

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THE *Atlantic Monthly* for December, 1884, presents the following attractive table of contents: In War Time, XXIII., XXIV., S. Weir Mitchell. Over the Andes, Stuart Chisholm. Francois Coppee, Frank T. Marzials. Penelope's Suitors, Edwin Lassetter Bynner. Two Harvests, Helen Jackson. The Lakes of Upper Italy, IV. Combination Novels, George Parsons Lathrop. These are Your Brothers," Olive Thorne Miller.

Among the Redwoods, E. R. Sill. Poe's Legendary Years, G. E. Woodberry. An American Flirtation, Grace Denio Litchfield. Canada and the British Connection, Edward Stanwood. The Contributors' Club. Books of the Month.

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THE first number of the *Central School Journal*, a sixteen page (12x9 in.) monthly, devoted to practical education, will be issued about the middle of December, 1884. The *Journal* will be edited and managed by Profs. E. M. Guilliams and S. A. D. Harry, members of the faculty of the Salina (Kansas) Normal University. These gentlemen have had a great deal of experience as teachers in both Public and Normal Schools, and understand the requirements of a first-class Educational Journal.

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THE danger of incidental harm to the community, or to certain classes of people, from the increased use of machinery, the extension of public works, etc., is greatly diminished when those who make the laws, and especially those whose duty it is to interpret them, recognize that law is a progressive science; that it is a means, not an end; that when a state of things arises for which there is no precedent, a new precedent must be made. How the most enlightened jurists hold this principle constantly in view, and how the common as well as the statute law is thus made to keep pace with the general advance of civilization. is admirably set forth in the leading article in the *North American Review* for December, "Labor and Capital before the Law," by Judge T. M. Cooley, of Michigan. To the same number, William K. Ackerman contributes some suggestive "Notes on Railway Management," Dr. Schliemann tells what he found in his excavations of the ruins of Tiryns, in Southern Greece, and Principal Shairp supplements his scholarly article on "Friendship in Ancient Poetry" with one on "Friendship in English Poetry." The other articles in the number are, "The British House of Lords," by George Ticknor Curtis, and "Responsibility for State Roguery," by John F. Hume.

*Popular Science Monthly*, conducted by E. L. and W. J. Youmans, is promptly on hand and contains the following articles: The Reformation in Time-Keeping, W. F. Allen, (Illustrated). American Aspects of Anthropology, E. B. Tylor, F. R. S. School-Culture of the Observing Faculties, J. C Glashaw. Queer Flowers, Grant Allen. Alcoholic Trance, T. D. Crothers, M. D. The Problem of Universal Suffrage, Alfred Fouillée. Cannibalism as a Custom, A. St. Johnston. Starvation—Its Moral and Physical Effects, Nathaniel E Davies, L. R. C. P. The Chemistry of Cookery, W. Mattieu Williams. The Perils of Rapid Civilization, C. F. Withington, M. D. Religion and the Doctrine of Evolution, Frederick Temple, D. D. Liquefaction of the Elementary Gases, Jules Jamin. The Oil-Supply of the World, II. Oddities of Animal Character. Biographical Sketch of Edward B. Tylor, (With Portrait) Correspondence. Editor's Table: Science in School Management; The Abuse of Political Power; A Jewish Explanation of Jewish Success. Literary Notices. Popular Miscellary. Notes.

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THE exceptional success of the Christmas Number of *Harper's Magazine* last year has led the editor and publishers to attempt this year to disappoint the public agreeably by giving them a still finer Number. The December issue contains no less than six separately printed plates, besides several other full page illustrations, the frontispiece being a reproduction, in the highest art of the wood-engraver, of the charming picture of the "The Boy Jesus in the Temple," by Prof. Hofmann of Dresden, one of the chief contributions of modern painting to religious art. The engraving is the work of W. B. Closson, from whose graver comes also in the same issue a reproduction of the "Flora" of Titian. The literary and artistic contents otherwise furnish an extraordinary and delightful variety of sketch, story, poetry, art, and music; while in the Easy Chair Mr. Curtis writes of "John Bull and Brother Jonathan at the Christmas Fireside;" and in the Drawer Mr. Warner has a pleasant prefatory word as to "The Universal Christmas Feast."